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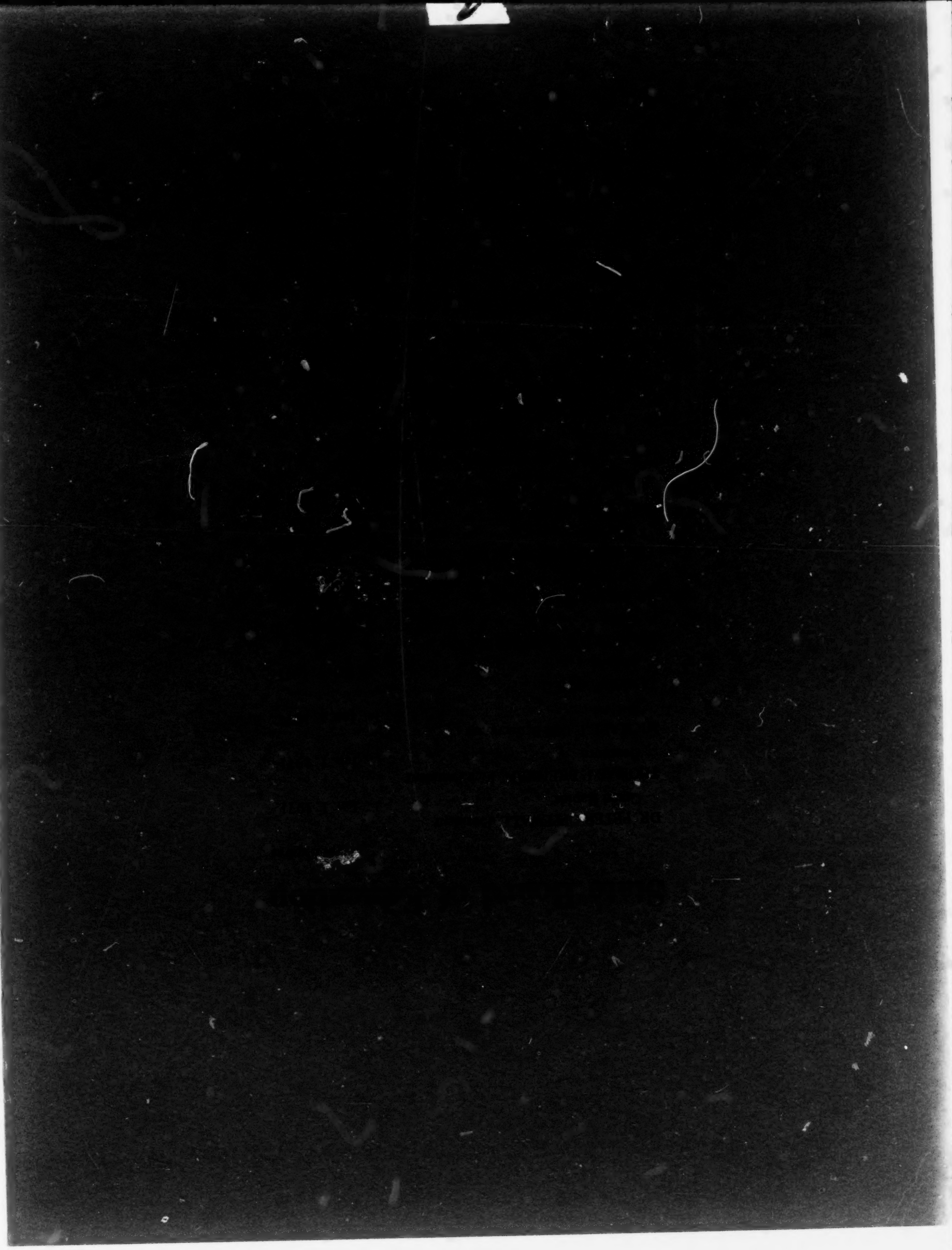
ABSTRACT

This report is based upon a survey of the supply and distribution of manpower in a wide variety of health professions and occupations, and of current educational resources in Michigan for the preparation of health care manpower. Part I of the report includes general recommendations, relating the planning and coordinating role of the State Board of Education to the needs of the State for trained health manpower, the role of related state, private, and voluntary agencies in planning to meet health care needs, the role of Michigan's institutions of higher education in meeting needs for health care manpower, and means of achieving cooperation and coordination in implementing these recommendations. Part II includes the findings and recommendations relating to educational planning for 26 broad categories of health care personnel, encompassing some 70 health occupations. (Author/GEB)



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EDUCATION FOR HEALTH CARE IN MICHIGAN

Report of the Citizens Committee on Education for Health Care

Education for Health Care Publications
Series 1, No. 5

Michigan Department of Education
Lansing, Michigan
1970

VT 013 211

FOREWORD

The Michigan State Board of Education in 1966 appointed a Citizens Committee on Education for Health Care for the purpose of advising the Board concerning the educational preparation of medical and allied health personnel. The State Board was fortunate in securing the services of two able chairmen for this important Committee. Justice Otis Smith, the first Chairman, guided the Committee's early studies of medical education in 1966; his successor, Mr. D. Eugene Sibery, provided outstanding guidance and leadership to the Committee's efforts for a period of two and a half years, until his departure from Michigan in July, 1969. The State Board was also fortunate in obtaining from The University of Michigan School of Public Health the services of Mrs. Eugenia S. Carpenter, who served as staff director for the Committee throughout its tenure.

The Citizens Committe and its three advisory committees have made significant contributions to planning for higher education in Michigan through a series of reports and recommendations which have been submitted to the State Board of Education over a period of three years. The development of this final report on state planning for education for health care represents the culmination of their efforts.

On January 14, 1970, the State Board of Education officially accepted the Education for Health Care report for publication and wide dissemination. The State Board has referred the report to the staff of the Department of Education for review and development of proposals for implementation of the recommendations.

The development of a framework for statewide planning and coordination of higher education is a slow, evolutionary process, and each contribution to that process redefines and reshapes goals. The report of the CCEHC, *Education for Health Care in Michigan*, is an important and challenging input to planning for higher education in Michigan. Moreover, the comprehensive nature of the goals and recommendations of this report have implications for all who are concerned with the development and appropriate utilization of health manpower adequate to meet the health care needs of the citizens of Michigan.

John W. Porter
Acting Superintendent of Public
Instruction

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November 4, 1969

Dr. John W. Porter
Chairman
State Board of Education
Lansing, Michigan 48902

Dear Dr. Porter:

I have the honor to transmit to you on behalf of the Citizens Committee on Education for Health Care our final report, *Education for Health Care in Michigan*.

In establishing the Citizens Committee in 1966, the State Board of Education gave to the Committee a broad charge "to study the facts and make recommendations to the Board concerning the educational preparation of medical and allied health personnel." The Committee was further charged with preparing a state plan for education for health care in Michigan.

The Citizens Committee appointed three advisory committees to assist in carrying out its mandate from the State Board; the General Advisory Committee, under the chairmanship of Dr. Robert Kinsinger; the Advisory Committee on Medical Education, under the chairmanship of Dr. Myron E. Wegman; and the Advisory Committee on Nursing Education, under the chairmanship of Dr. Margaret L. Shetland.

Without the valuable services of these advisory committees and of the project staff, the Citizens Committee could not have successfully carried out the important task which the State Board assigned to it. Dr. Kinsinger and his Committee deserve special commendation for their outstanding contributions in organizing and synthesizing the vast quantity of data and statistics that were compiled in the development of the final report.

We submit this report to the State Board of Education in the belief that implementation of the goals and recommendations contained herein will make a positive contribution to the planning and development of educational programs for the preparation of health manpower in Michigan.

Sincerely yours,

Mrs. Elizabeth D. Pingree
Vice Chairman
Citizens Committee on Education
for Health Care

ACKNOWLEDGMENTS

We are indebted to the many individuals and organizations who contributed to the development of this report. Governmental agencies and professional organizations at the state and national levels were generous in their responses to our requests for data, advice, and evaluation. Individual health practitioners and educators in the broad spectrum of health occupations surveyed provided invaluable information, counsel, and advice. It is impossible to list all of the people who contributed to this project. The names of persons who contributed to, reviewed, or commented upon individual sections of the final report are listed at the end of Part II.

We also wish to thank the staff of the Michigan Department of Education for their cooperation and assistance throughout Phase I and Phase II of the Education for Health Care Project. We owe special thanks to Dr. John Porter and Dr. Gerald Beckwith for their continuing interest, support, and participation in the activities of the Citizens Committee on Education for Health Care and its advisory committees.

Finally, we gratefully acknowledge the financial support provided by the Kellogg Foundation, by Michigan State University, The University of Michigan, Wayne State University, and through the General Research Support Grant to the School of Public Health, The University of Michigan, Public Health Service Grant No. 5 S01 FR 05447-08.

STAFF

Eugenia S. Carpenter - Project Director and Research Associate
Geraldine J. Wallace - Assistant Project Director and Research Assistant
J. David Killian - Assistant in Research

Department of Medical Care Organization, School of Public Health,
The University of Michigan

CITIZENS COMMITTEE ON EDUCATION FOR HEALTH CARE

STATEMENT OF PURPOSE

The task of the Committee on Education for Health Care, an Advisory Committee to the State Board of Education, is to study the facts and make recommendations to the Board concerning the EDUCATIONAL PREPARATION of medical and allied health personnel, including:

(1) adequacy of educational facilities and faculty for the training of medical and allied health personnel needed to meet the total health needs of the citizens of the state;

(2) legislation and administrative rules of licensure which have implications for educational programs in these fields.

To achieve these tasks, the Committee will endeavor to work with the various groups in the state with similar interest, ever mindful of the necessity to avoid undesirable duplication of effort, when such efforts relate to the educational process.

Inherent in the task is the need to:

(1) make an inventory of existing educational capacities for the preparation of medical and allied health personnel;

(2) assess the need for changes to meet citizen demand and future educational health care commitments;

(3) develop a plan for providing the educational facilities and programs necessary to meet total health care needs.

On the basis of the information developed in the above and the policy recommendations arising therefrom, the Committee on Education for Health Care may conduct further studies and propose additional research or demonstration projects related to its findings and recommendations.

TABLE OF CONTENTS

	PAGE
Part I:	
Introduction	1
General Recommendations on Planning for Education for Health Care	3
Part II:	
Summary of Major Recommendations on Educational Planning for Health Care Personnel in Michigan	9
Administration of Health Services	17
Chiropractic	23
Dental Health Services	27
Dietetic and Nutritional Services	35
Environmental Health Manpower	39
Hospital-Based Technicians	43
Library Services	47
Medical Engineering	51
Medical Laboratory Technology & Related Services	53
Medical Record Services	59
Medical Secretarial and Office Skills	63
Medicine and Osteopathy	65
Nursing Manpower	69
Occupational Therapy Services	73
Orthopedic and Prosthetic Appliance Making	77
Pharmacy	79
Physical Therapy	83
Podiatry	87
Psychology	91
Radiologic Technology (X-Ray Technology)	95
Social Work	99
Specialized Rehabilitative Services	103
Speech Pathology and Audiology	105
Veterinary Medicine	107
Visual Care	111
Vocational Rehabilitation Counselors	115
SELECTED REFERENCES AND ACKNOWLEDGMENTS	117
APPENDIX	139

PART I

PLANNING AND COORDINATION OF EDUCATION FOR HEALTH CARE

INTRODUCTION

The Michigan State Board of Education, under the 1963 Constitution, is designated "as the general planning and coordinating agency for all public education, including higher education...". Pursuant to this broad charge to provide for the systematic development of higher education in Michigan, the State Board of Education has developed a general state plan for higher education,[1] establishing a framework within which state planning for higher education, as a continuous evolutionary process, can go on.

The State Board of Education early recognized the need to encourage and initiate studies of educational needs relating to professional and technical education in specific areas. The education and training of persons in the health care field was identified as an area of critical need, as well as one requiring extensive study and analysis. Thus, early in 1966, the State Board of Education authorized a three-phase study of Education for Health Care, covering:

1. An inventory of health care manpower in Michigan including an inventory of educational programs for the preparation of such manpower;

2. Development of a plan for providing educational facilities and programs necessary to meet the needs for health care personnel in Michigan;

3. The conducting of further studies and research or demonstration projects relating to findings and recommendations of Phases I and II.

To some extent there has been an inevitable overlapping of the above outlined phases of the study. Although the basic approach was to view health manpower needs within the context of the total health care system, urgent public policy considerations required the singling out

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[1] *State Plan for Higher Education in Michigan*, Lansing: Michigan Department of Higher Education, 1969.

of the areas of medical education and nursing education for special consideration. As a result, separate reports in both of these areas have already been issued;[2] therefore, medical education and nursing education are discussed in considerably less depth in this report than their significance to the total health care system would warrant.

This report, based upon a survey of the supply and distribution of manpower in a wide variety of health professions and occupations, and of current educational resources in Michigan for the preparation of health care manpower is divided in two parts:

1. General recommendations, relating the planning and coordinating role of the State Board of Education to the needs of the State for trained health manpower; the role of related state agencies and of private and voluntary agencies in planning to meet health care needs; the role of Michigan's institutions of higher education in meeting needs for health care manpower; and means for achieving cooperation and coordination in implementing these recommendations.

2. Findings and recommendations relating to educational planning for 26 broad categories of health care personnel, encompassing some 70 health occupations.

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[2] *Recommendation Concerning the Proposal for a Full-Degree Medical Program at Michigan State University*, A report to the State Board of Education by the Citizens Committee on Education for Health Care, Lansing: Michigan Department of Education, November, 1966.

Osteopathy in the United States and Michigan, A staff report from the Citizens Committee on Education for Health Care to the State Board of Education, Lansing: Michigan Department of Education, August, 1967.

Nursing Education Needs in Michigan, A report to the State Board of Education by the Advisory Committee on Nursing Education, Lansing: Michigan Department of Education, 1970.

GENERAL RECOMMENDATIONS ON PLANNING FOR EDUCATION FOR HEALTH CARE

Development of a framework for planning to meet Michigan's needs for health manpower requires inputs from a variety of sources, including government agencies, educational institutions, voluntary and professional associations, and official and voluntary planning groups. This report attempts to outline the major areas of concern to which educational planning to meet health manpower needs must address itself.

The recommendations contained in the report are postulated on the following premises: health manpower needs must be viewed within the context of the total health care system; health manpower planning must concern itself with whatever measures are necessary to assure that the supply, distribution, and qualifications of health workers are adequate to meet the health care needs of the population; educational preparation of health workers is but one aspect of the complex of measures necessary to achieve those goals.

Because this report is addressed to the State Board of Education the major recommendations related to planning are concerned chiefly with the means by which the State Board, in its constitutional role as the general planning and coordinating agency for public higher education, can influence educational institutions to take appropriate steps to improve the supply, distribution and utilization of health manpower in Michigan.

l. Whereas, the State Board of Education, pursuant to its designation under the Michigan Constitution as the general planning and coordinating agency for higher education, has authorized the development of a state plan for education for health care; and

Whereas, the Governor has designated the Comprehensive State Health Planning Commission as Michigan's long-range interdepartmental health planning agency covering manpower, as well as services and facilities, pursuant to federal legislation (P.L. 89-749), and has appointed the Superintendent of Public Instruction as a member of that Commission; and

Whereas, the Michigan Association for Regional Medical Programs, established pursuant to federal legislation (P.L. 89-239), represents a semi-official body with special planning responsibilities in the area of continuing education; and

Whereas, there is a need to avoid duplication of planning effort and to provide for a central planning focus at the state level for the ongoing mobilization and long-range coordination of the widely diverse resources of the state for manpower development in the health fields,

Therefore, it is recommended that a single health manpower planning advisory body be established through the cooperative efforts of the State Board of Education and Comprehensive State Health Planning Commission; further, that the activities and membership of such an advisory body be sufficiently broad-based to serve the needs of the Michigan Association for Regional Medical Programs as well as those of similar bodies which may be established.

2. *The State Board of Education, as the principal agency for planning and coordination of higher education in Michigan, should encourage and assist appropriate educational institutions in the state to initiate, develop, and expand programs for the preparation of health care personnel in accordance with goals and priorities established under a continuously evolving plan for education for health care in Michigan.*

3. *The State Board of Education, with the assistance of the Comprehensive State Health Planning Commission and the Michigan Association for Regional Medical Programs, should stimulate educational institutions, health facilities, professional associations and other appropriate groups to plan cooperatively on a regional basis for the development of Health Care Education Programs at the community college, baccalaureate, and graduate levels in order to provide in the most effective and efficient way for the health manpower needs of the state. Wherever feasible, such planning efforts should be undertaken under the auspices or with the cooperation of the designated areawide comprehensive health planning agencies.*

4. *The State Board of Education should encourage the university medical centers in the state, as a part of the role definition for the parent universities, to undertake joint planning action to identify the leadership role that each may assume in the development and dissemination of research findings relevant to the education of health care personnel, and in the continuing education of such personnel. Such planning efforts should also be addressed to the question of identifying for each medical center geographic "spheres of influence" that will complement and integrate regional planning efforts.*

5. *The State Board of Education should develop a plan for health occupations centers for the education of vocational and technical health workers. Planning should identify new administrative patterns and additional sources and methods of financing so as to enable a single institution such as a community college, or a consortium of educational resources, to provide educational programs and services on a coordinated basis to serve an areawide or regional population.*

6. The State Board of Education should encourage and assist educational institutions with graduate capacities and strengths in both health science disciplines and education to develop new programs and expand existing ones for the preparation of faculty to staff health care educational programs at all academic levels, with particular emphasis on such shortage areas as nursing and health technology programs at the community college level.

7. Each public baccalaureate and community college which is involved in, or contemplates initiating, programs for the preparation of health care personnel should submit to the State Board of Education, as a part of its five-year plan of operations, a statement of its long-range plan for the role of the institution in health care education. Such planning should be based upon the concept of developing clusters, of "families" of related programs, in order to broaden the spectrum of opportunity for individual students and promote joint learning experiences, as well as to make optimum use of resources.

8. Universities and colleges with considerable strength in appropriate academic areas should develop interdisciplinary programs for the preparation of health care personnel.

9. Planning for curriculum development by educational institutions and professional and occupational associations should focus on the educational and vocational continuum so that multiple opportunities for job entry at various educational levels, and opportunities for reentry from the job market to the educational setting likewise are provided.

10. Where clinical experience is an integral part of an education for a health profession or occupation, such experience should be the responsibility of the educational institution offering the program.

11. The State Board of Education should encourage educational institutions in Michigan to develop innovative approaches to the education of health care personnel. Areas in which such innovation and experimentation should be undertaken include: the development of shared learning experiences to stimulate the team approach among health care workers; restructuring of curriculum to introduce a variable pace of learning geared to the background and ability of the individual student; and the development of new types of settings for the clinical phases of education for health care.

12. The State Board of Education and the Michigan Association for Regional Medical Programs should seek to coordinate their roles in planning for continuing education for health care personnel.

13. Educational institutions, health facilities and organizations, public and voluntary agencies should place high priority on the development, implementation, and evaluations of a variety of new approaches to recruitment into the health care occupations.

14. A useful data bank for health manpower information should be established in Michigan; therefore the comprehensive health planning commission should take a leadership role in arranging for appropriate departments and agencies of state government, state health associations, and professional associations to establish an ad hoc committee which will be concerned with the development of an automatic health manpower information storage and retrieval system for the state of Michigan.

15. The State Board of Education should periodically reassess approved programs of health care education located in public institutions of higher education in order to insure that quality and effectiveness of the program and reasonable levels of production are maintained.

PART II

EDUCATIONAL PLANNING FOR HEALTH CARE PERSONNEL IN MICHIGAN

PART II

SUMMARY OF MAJOR RECOMMENDATIONS ON EDUCATIONAL PLANNING FOR HEALTH CARE PERSONNEL IN MICHIGAN

HEALTH FIELD AND OCCUPATION	PRIORITIES FOR ACTION
1) ADMINISTRATION OF HEALTH SERVICES Hospital Administrator Medical Care Administrator Nursing Home Administrator Public Health Administrator Service Unit Manager Ward Clerk	a) Continuing education - with emphasis on administrative personnel who lack graduate-professional education. b) Curriculum development - for first-line and middle management educational programs.
2) CHIROPRACTIC Chiropractor	a) Health education - for consumers. b) Licensure - restrict scope of practice.
3) DENTAL HEALTH SERVICES Dentist Dental Assistant Dental Hygienist Dental Laboratory Technician	a) Expansion - of dental education facilities. b) Licensure - amend to expand duties of auxiliaries and establish registered dental assistant category. c) Dental auxiliary programs - 1) establish regional patterns of need and identify locations for new and expanded programs; 2) strengthen existing programs. d) Faculty - develop and expand programs preparing faculty for dental auxiliary programs. e) Recruitment - older women and males into dental aux-

		iliary education; more women into dentistry. f) Continuing education - expand and improve for dentists; upgrading and refresher for dental auxiliaries; coordination of efforts to improve dental team concept.
4)	DIETETICS AND NUTRITION Dietitian Dietary Technician Food Service Supervisor Nutritionist Nutrition Aide	a) Curriculum - explore integration of academic and clinical aspects of dietetics education; shift emphasis to reflect new knowledge and organizational changes. b) Graduate education - expand, especially for dietitian-nutritionist in hospital setting. c) Subprofessional education - expand for food service supervisor, dietary technician emphasizing health facility setting; develop experimental programs to train nutrition aides.
5)	ENVIRONMENTAL HEALTH SERVICES Environmental Health Engineer Environmental Health Specialist Environmental Health Technician Health Physicist Hospital (Radiological) Physicist Industrial Hygienist Sanitarian Sanitarian Technician Radiological Health Specialist	a) Recruitment - major emphasis on multi-sponsored program to attract more students to existing educational programs. b) Utilization - establish study committee to develop more effective patterns of manpower use. c) Subprofessionals - develop pilot program to train environmental health technicians in community colleges.
6)	HOSPITAL-BASED TECHNICIANS EKG Technician EEG Technician Hemadialysis Technician	a) Curriculum - explore standardization and core for related types of technicians.

	Inhalation Therapist Surgical Technician	b) Training programs - pool resources of hospitals presently conducting in-service education.
7)	LIBRARY SERVICES Medical Librarian Hospital Librarian	a) Graduate education - establish program in medical librarianship at Wayne State and The University of Michigan. b) Continuing education - establish programs for medical library personnel under auspices of U-M and Wayne State.
8)	MEDICAL ENGINEERING Biomedical Engineer Biomedical Engineering Technician	a) Graduate education - emphasize quality programs and student recruitment. b) Subprofessional training-should develop only in close cooperation with university medical center.
9)	MEDICAL LABORATORY SERVICES Medical Technologist Certified Laboratory Assistant Cytotechnologist Histologic Technician Medical Laboratory Technician	a) Medical technologist - efforts to improve quality and effectiveness of programs should take priority over expanding educational resources for medical technology education; efforts should include upgrading college science content, improved student selection and counseling, and consolidation or phasing out of smaller hospital-based programs. b) Subprofessionals - encourage an orderly development of the new two-year program for medical laboratory technicians in community colleges. c) Utilization - upgrade existing laboratory personnel through continuing education or on-the-job training; develop new approaches

		to recruit inactive personnel.
10)	MEDICAL RECORD SERVICES Medical Record Librarian Medical Record Technician	a) Educational programs - expand programs at both professional and technical level; emphasis on innovative educational design; computer design, computer technology, faculty recruitment, availability of supportive facilities. b) Continuing education - to refresh, maintain, and upgrade skills of technical and professional workers. c) Utilization - sharing of professional skills among smaller hospitals; improved organization and division of labor within medical records departments.
11)	MEDICAL SECRETARIAL AND OFFICE SERVICES	Curriculum - standardize length and content of course work and nomenclature, based upon assessment of job entry skill requirements in the field.
12)	MEDICINE AND OSTEOPATHY Physician (M.D.) Physician (D.O.)	a) Expansion - of existing full-degree medical schools to optimum capacity and of Michigan State's medical program to degree-granting status and to optimum size.
13)	NURSING AND RELATED SERVICES Registered Nurse Licensed Practical Nurse Licensed Psychiatric Attendant Nurse Nurse Aide Trained Attendant Home Health Aide or Homemaker	a) State plan - under aegis of official state body to set specific goals for educational programming. b) Expand programs preparing RN's - in two phases: expand existing facilities; establish new programs. c) Utilization - organizational innovations; delegate non-nursing functions to managerial and other personnel.

		d) Educational progression - facilitate upward movement from one level of nursing preparation to another. e) Recruitment - emphasize public information, counseling, and reaching disadvantaged.
14)	OCCUPATIONAL THERAPY Occupational Therapist Occupational Therapy Assistant	a) Educational programs - expansion of present programs based on statewide assessment of need. b) Utilization - greater use of part-time therapists and efforts to reactivate inactive professionals.
15)	ORTHOPEDIC AND PROSTHETIC APPLIANCE MAKING	Training programs - explore possibility of pilot program to train bench technicians.
16)	PHARMACY Pharmacist Pharmacy Helper	a) Education - strengthen clinical pharmacy, emphasize joint learning with other health professionals, and develop greater emphasis on pharmacist's role as a community health educator. b) Utilization - reassess role of pharmacist in institutional and community settings, so as to enhance professional aspects of his functions.
17)	PHYSICAL THERAPY Physical Therapist Physical Therapy Assistant Physical Therapy Aide	a) Professional education - develop third program in Michigan. b) Subprofessional education - pilot program for P.T. Assistant in community college setting.

18)	PODIATRY Podiatrist	Utilization - devise means for integrating podiatrist's services into the mainstream system of delivery of health care services.
19)	PSYCHOLOGY Clinical Psychologist	Improve - utilization patterns and provide better incentives for retention of trained personnel in the state.
20)	RADIOLOGIC TECHNOLOGY Radiologic (X-Ray) Technology	Educational programs - work with national professional associations in order to restructure curriculum so as to adapt training to community college settings.
21)	SOCIAL WORK Social Worker Social Work Aide	a) Professional education - strengthen medical social work content and utilize interdisciplinary resources. b) Subprofessional education - support proposed program at Ferris State as pilot for state. c) Continuing education - graduate schools take lead in developing multi-sponsored programs, with emphasis on needs of persons at less than M.S.W. level. d) Utilization - improve patterns of use to maximize availability of scarce professional talents.
22)	SPECIALIZED REHABILITATION SERVICES Corrective Therapist Educational Therapist Homemaking Rehabilitation Consultant Manual Arts Therapist Music Therapist Recreational Therapist	a) Education - develop structured undergraduate program in recreation therapy. b) Recruitment - direct to secondary schools and undergraduates in two- and four-year institutions.

23)	SPEECH PATHOLOGY Audiologist Speech Pathologist	Education - revise state certification standards in accordance with recommendations of special study committee.
24)	VETERINARY MEDICINE Veterinarian Laboratory Animal Technician	a) Education - explore more flexible curriculum with options at undergraduate level. b) Recruitment - to attract practicing D.V.M.'s into educational preparation for teaching and research. c) Utilization - delegation of routine functions to technicians.
25)	VISUAL SERVICES AND EYE CARE Ophthalmologist Optometrist Dispensing Optician Optical Laboratory Technician Orthoptist	a) Professional education - establish school of optometry in Michigan. b) Subprofessional education - training programs should await development of jointly sponsored curriculum to meet needs of optometrists and ophthalmologists.
26)	VOCATIONAL REHABILITATION Rehabilitation Counselor	a) Professional education - expand existing programs. b) Recruitment - directed to undergraduates in social sciences and related fields. c) Utilization - Civil Service Department should restructure jobs to maximize use of student interns, case aides, indigenous population.

THE ADMINISTRATION OF HEALTH SERVICES

Introduction

The administration of health services involves a variety of personnel with varied educational backgrounds, employed at several occupational and professional levels. At present, administrative positions encompass a broad spectrum of responsibility, as for example, from comprehensive health planning and hospital administration to the management of a service unit within a single hospital facility.

Accurate data are not available on the number and location of health administrators in Michigan. However, it may be assumed that a minimum of 1,000 such persons are employed in hospitals, long-term care and nursing home facilities, health departments, and voluntary health agencies throughout the state.

In general, educational programs for health administrators are well developed in the areas of public health and hospital administration. The University of Michigan School of Public Health offers both the master and the doctor degrees in public health and administers the program in hospital administration leading to the M.H.A. degree.

Nationally, there has been a trend towards the development of middle management educational programs at the baccalaureate leve. Most programs in this area are relatively new and firm curriculum patterns, as yet, are unestablished. Until recently, Michigan State University has offered a baccalaureate program in health facilities management through its School of Hotel, Restaurant, and Institutional Management. This program has been discontinued for lack of faculty. The final courses required to complete the major sequence for currently enrolled students will be offered during the academic year 1969-70.

Community colleges in Michigan have demonstrated growing interest in associate degree programs for health management personnel. Thus far, the most clearly defined educational program at this level is that of unit manager or ward service manager. Northwood Institute at Midland initiated a two-year program in hospital unit management during the fall term, 1967. A second associate degree program in health services administration was initially planned at Oakland Community College for

fall 1969, with the intent of preparing nursing home administrators. Although the State Board of Education approved the college's proposal, the institution has since decided not to undertake the program in 1969.

Continuing education in the field of health administration is offered by a number of sources, both nationally and in Michigan. At the state level, courses in the form of workshops, conferences, and seminars are given by The Michigan Hospital Association, the Greater Detroit Area Hospital Council as well as other agencies and associations. Recently, the Center for Continuing Hospital Education was established at the U of M by a grant from the W. K. Kellogg Foundation. The program, initiated in 1968, is offered each summer in Ann Arbor. It consists of a series of coordinated, intensive five day institutes, conducted at the level of graduate professional education. The Center represents the clearest attempt thus far, to establish a permanent mechanism for the systematic approach to continuing education of health administrators in Michigan.

The present efforts in the area of continued professional training reach most effectively those personnel who have graduate professional training. There is a recognized gap in this service with respect to personnel without extensive formal education who are functioning in administrative positions in small hospitals, extended-care facilities, and nursing homes.

Trends in the Field Affecting Education

The increasing institutionalization of medical care and new emphases on health planning at all levels have increased quantitatively and qualitatively the demand for health administrators and planners.

In recent years, the definition of adequate health services has been steadily expanded, and the qualitative standards of health care have consistently been raised. These facts, manifest in recent efforts to adapt the health system to societal needs -- Medicare, Medicaid, Regional Medical Programs, Comprehensive Health Planning -- have resulted in the need for professional personnel with broad preparation in the social sciences.

This growing need has coincided with the formulation of an accepted body of administrative theory and the infusion of new approaches in the behavioral sciences. These developments have served to legitimize these disciplines and to make them substantially relevant to the health system. The resulting trend in administration and planning areas of the health field has been towards utilization of personnel whose special competence lies in administrative and social sciences.

At present, curricula in schools of public health and hospital administration are undergoing intensive reevaluation and reorganization in order to maintain and improve the careful integration of several disciplines in a complete professional program. In 1966, the U of M School of Public Health established a 12 hour core course, required of all MPH students. This is a two semester interdepartmental course designed to give each student a common foundation of basic concepts from each of the subfields in public health. The core course has been revised and will continue to be reevaluated in light of experience and changing needs in education.

The master's program in hospital administration was revised extensively, effective with the fall term of 1968. The requirement for academic course work was set at 60 hours and the administrative residency was eliminated as a degree requirement. The extension of academic work was needed in order to keep pace with the general knowledge explosion and to effectively maintain the multidisciplinary character of the program.

In addition to curriculum evaluation and revision, the School of Public Health has developed, where appropriate, new programs to meet manpower needs in the field. One example is the new master's degree program in health planning which will begin in fall 1969. This will be an interdepartmental program aimed directly at the growing need for trained comprehensive health planners.

At less than the graduate professional level of education the need remains to determine with some precision which of the many supportive administrative positions in health facilities can usefully be served by educational programs distinct from those offered by other disciplines. For those first line and middle management positions which are currently thought to require preparation containing a distinctive health component, there is a further need to determine what is the most appropriate level and type of educational program. Examples of such jobs are the new and increased numbers of administrative positions resulting from the rapid growth of extended care facilities and nursing homes and also from new mechanisms for the delivery of health services, i.e., neighborhood health centers and occupational health programs.

Legislation with implications for educational programs in nursing home administration, passed by the Michigan Legislature in July, 1969 and signed into law in August, will take effect on November 1, 1969. This law provides for the licensing and regulation of nursing home administrators and will require new nursing home administrators and those currently employed with fewer than 4 years' experience to complete a course in nursing home administration approved by the Department of Licensure and Registration or show evidence of having previously completed an equivalent course or training program.

In all likelihood additional courses will be required and established in the state to allow current administrators to meet licensure standards. In addition, it is likely that the licensure requirement will spur the interest of community colleges in offering two year programs in nursing home administration similar to the program planning by Oakland Community College.

There has been considerable investigation and evaluation of certain management positions and concepts, most notably that of service unit management (SUM). SUM has been the subject of pilot programs and extensive research both nationally and in Michigan. However, the available evidence indicates that SUM concepts and personnel have been utilized at several levels and in varying degrees of sophistication within the hospital system. As yet, no single answer has emerged to the question of optimum level of preparation for this occupation.

In general, it is fair to conclude that the curricula for first line and middle management programs remain in the state of flux. Adequate guidelines for the development of new programs in this area do not exist. Therefore, it is reasonable to expect that schools interested in offering programs in the health administration area will make full use of available information and rely on experts in the field for consultation.

In addition to the impact of developments on health administration, as previously discussed, it is important to note that these same factors have important implications for the training of health professionals. Increase in the number of health workers involved in patient care has required physicians, nurses, and other health professionals to work with and supervise a number of technician level personnel. Evidence indicates that health team leadership is of growing importance. Therefore, it is logical to assume that the preparation of health professionals should include course(s) in administrative theory. Such courses would provide health professionals with relevant techniques and concepts from administrative theory and social psychology and better enable them to assume effective leadership on the health team.

Recommendations

1. The State Board of Education should encourage and assist the School of Public Health, University of Michigan, in undertaking the development of a continuing education service for health administrators without graduate-professional education who are functioning in administrative positions in small hospitals, extended-care facilities, and nursing homes. Careful consideration should be given to the development of new approaches to continuing education or the modification of traditional methods in a effort to provide a truly effective service to these personnel.

2. Recognizing the emerging interest of community colleges in the education of health administrators, the Department of Education should establish an ad hoc committee to include membership from community colleges, faculty from the program in hospital administration at the University of Michigan School of Public Health, and staff from the Bureau of Higher Education. This committee would be charged with the task of clarifying the role of community colleges with respect to the education of administrative personnel in the health field.

CHIROPRACTIC

Introduction

In Michigan, chiropractors are licensed under Act 145, (P.A. 1933), as amended, to practice the healing arts within the definition of the specific area of chiropractic competence. The Michigan statute defines chiropractic as "the locating of misaligned or displaced vertebrae of the human spine, the procedure prepatory to and the adjustment by hand of such misaligned or displaced vertebrae and surrounding bones or tissues, for the restoration and maintenance of health."

Within the chiropractic community itself, there are two official definitions of chiropractic extant, expressing the views of the two national associations representing chiropractors. The International Chiropractors Association (ICA), representing the group referred to as "straights," defines chiropractic as: "...that science and art which utilizes the inherent recuperative powers of the body, and deals with the relationship between the nervous system and the spinal column, including its immediate articulations, and the role of this relationship in the restoration and maintenance of health...". The American Chiropractic Association (ACA), representing the group known as "mixers," defines chiropractic as: "...a study of problems of health and disease from a structural point of view with special consideration given to spinal mechanics and neurological relationships."

Two recent studies, undertaken within the Federal government, have focused on the legal status and scientific and theoretical basis of chiropractic. The first of these, the Report of the National Advisory Commission on Health Manpower (Vol. 2) issued in November, 1967, focused on licensure and regulation of chiropractors. The Report said of chiropractic:

> Medical authorities unanimously agree that chiropractic has no validity. The cult's theories have never been supported by objective evidence, and they have been thoroughly refuted by medical science. Besides considerable economic consequences, the dangers inherent in this healing cult are twofold. First, chiropractic treatment frequently delays proper and effective medical care until it is too late. Second,

chiropractic treatment often produces actual physical damage to patients. Ideally, therefore, the statutes should be repealed to remove the cult's shield of legitimacy. Realistically, however, since repeal is unlikely in light of the power of the chiropractic lobby, suggestions are made here for improvements in statutory formulation and enforcement. But it should be recognized that no matter how high they are set, no matter how strictly they are enforced, licensure standards cannot redeem the scientific invalidity of chiropractic. Moreover, increased official attention to licensure provisions can only lend credence to public misconception regarding chiropractor.

The second report, *Independent Practitioners Under Medicare*, a report to the Congress by the Secretary of Health, Education, and Welfare dated December 28, 1968, recommended against the inclusion of chiropractic services under coverage of Medicare. The conclusions of the Report, on the basis of which this recommendation was made, were as follows:

1. There is a body of basic scientific knowledge related to health, disease, and health care. Chiropractic practitioners ignore or take exception to much of this knowledge despite the fact that they have not undertaken adequate scientific research.

2. There is no valid evidence that subluxation, if it exists, is a significant factor in disease processes. Therefore, the broad application to health care of diagnostic procedure such as spinal analysis and a treatment procedure such as spinal adjustment is not justified.

3. The inadequacies of chiropractic education, coupled with a theory that de-emphasizes proven causative factors in disease processes, proven methods of treatment, and differential diagnosis, make it unlikely that a chiropractor can make an adequate diagnosis and know the appropriate treatment, and subsequently provide the indicated treatment or refer the patient. Lack of these capabilities in independent practitioners is undesirable because: appropriate treatment could be delayed or prevented entirely; appropriate treatment might be interrupted or stopped completely; the treatment offered could be contraindicated; all treatments have some risk involved with their administration, and inappropriate treatment exposes the patient to this risk unnecessarily.

4. Manipulation (including chiropractic manipulation) may be a valuable technique for relief of pain due to loss of

mobility of joints. Research in this area is inadequate; therefore, it is suggested that research that is based upon the scientific method be undertaken with respect to manipulation.

In addition to the foregoing national reports, there have been other studies of chiropractic which have come to essentially similar conclusions, notably the extensive study of chiropractic in California conducted by the Standard Research Institute in 1960, and that undertaken in 1965 by Justice Lacroix of the Superior Court of Quebec at the request of the Quebec government. Further, the U.S. Supreme Court, in 1965, upheld a lower court ruling which sustained a Lousiana law requiring chiropractors to have medical school degrees [England vs. La. State Bd. of Med. Examiners, 246 F. Supp. 993 (E.D. La. 1965), aff'd mem. 384 U.S. 885 (1966)].

Conclusions

In the light of the extensive body of data that has been accumulated from the numerous studies of the subject, it is clear that extension or expansion of the practice of chiropractic in the state of Michigan would not be in the best interests of the health and welfare of the citizens of the state. Solution of the problems inherent in the existence of unscientific schools of practice, such as chiropractic, requires a two-pronged approach. First, there need to be expanded and improved efforts to educate consumers of health services about the effective use of the scientifically based health care system available to them throughout the state. Secondly, efforts to expand the scope or area of practice of chiropractic in the state of Michigan should be opposed. One such effort was avoided only by a Governor's veto in 1967. Moreover, consideration should be given to a moratorium on the issuance of any new licenses to chiropractors.

DENTAL HEALTH SERVICES

Introduction

Dentistry is "the healing art concerned with the health of the mouth, especially the teeth."[1]

Four types of health personnel are engaged, some directly and some indirectly, in the provision of dental health services: dentists, and three auxiliary groups -- dental hygienists, dental assistants, and dental laboratory technicians.

The dental hygienist, working under the direction of the dentist, is the only auxiliary who may provide service directly to the patient; chief duties include dental prophylactic treatments and dental health education. The dental assistant's primary function is chairside assistance to the dentist; other duties may include exposing and processing x-rays, sterilizing instruments, assisting with laboratory work and maintaining office records and accounts. The dental laboratory technician constructs and repairs various dental restorations and appliances, according to the dentist's prescription.

Dentists and dental hygienists are licensed under dental practice laws in all states. Most dental practice laws also require that a dentist's written work authorization or prescription must accompany all work submitted to dental laboratories. Although neither dental assistants nor dental laboratory personnel are required to be licensed, they may be certified under voluntary programs. The Council on Dental Education of the American Dental Association accredits dental schools and dental auxiliary training programs. The professional education of a general dentist requires four years of pre-dental college preparation. Dental specialty preparation requires two or more years beyond the dental degree.

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[1]Encyclopedia Britannica, Inc., Vol. 7, William Benton, Publisher, p. 260, 1967.

Dental hygiene education requires at least two years at the college level; two types of programs are available: the two-year associate degree or certificate program, qualifying a hygienist for clinical practice as a registered dental hygienist, and the four-year bachelor's program, which is required for leadership positions in teaching and public health. About half of the dental hygiene programs are integral parts of schools of dentistry, but an increasing number of programs are offered in community and junior colleges. The majority of dental assistants and dental laboratory technicians currently active have been trained on-the-job. Although a considerable number of one- and two-year certificate programs for dental assistants have been developed in community and junior colleges in recent years, their total output still represents a small proportion of persons working in the field. More recently, programs for the training of laboratory technicians have been established in educational settings at both two- and four-year institutions. In general, the academic training for the laboratory technician is two years in length.

Michigan has two dental schools, at the University of Detroit and the University of Michigan. The two dental schools also offer both certificate and baccalaureate degree educational programs for dental hygienists, and the University of Detroit has a dental assistant program as well. Currently, an average of 140 dentists per year are graduated by the two schools; the expansion of the University of Michigan entering class to 150 by 1975 will increase the total graduates to an average of 195 by 1979.

In addition to the two dental school-based hygiene programs, there are two other programs operating for dental hygienists; at Ferris State College (initiated in 1965) and Flint Community College (initiated in 1967). By 1972, the four existing dental hygiene programs in Michigan will be producing about 160 graduates annually.

There are twelve dental assistant programs now in operation in the state, at either the one- or the two-year levels: at Delta, Ferris State, Flint Community Junior, Grand Rapids Junior, Lansing Community, Michigan Lutheran, Macomb County Community, Northwestern Michigan, Oakland Community, and Washtenaw Community Colleges, and the University of Detroit. In addition, two dental laboratory technology programs are in operation, located at Ferris State College and Highland Park College.

Trends Affecting Educational Planning

Considerable data are available attesting to a large backlog of unmet dental needs. The dental findings of the Health Examination Survey of the U.S. Public Health Service have provided statistical evidence of widespread dental disease among all age groups. Studies in Michigan

by the Michigan Dental Association and by the Michigan Department of Public Health have revealed unmet needs for dental services among such population groups as children, the aged, low-income and institutionalized populations.

Studies have identified as principal determinants of demand for dental services the following: accessibility of services; income levels; and educational attainment. Effective demand for dental services can be expected to increase at a proportionately greater rate than population due to several factors: rising levels of educational attainment, increases in real personal income, extension of coverage of dental prepayment and insurance plans, new governmental programs to make dental services available to the needy and to children, and the dental public health education efforts of the dental profession, voluntary agencies and schools.

Advances in dental research and the impact of fluoridation on the incidence of dental disease can be expected to alter the emphasis in dental practice in the future. With 90 percent of Michigan's public water supply now fluoridated there will be a lowered incidence of dental caries in the future. Thus, pedodontics will increasingly emphasize preventive measures as opposed to operative dentistry. Dental treatment for adults will also place greater emphasis on preventive dentistry; in addition, treatment of periodontal disease should receive increasing attention.

In the face of the manifest unmet needs for dental health services and evidence of the growing effective demand for such services, the question is how the output of dental services can be increased. Because of the lead time needed either to establish new schools of dentistry or to increase the capacity of existing schools substantially, the total supply of dentists can be fairly well predicted up to about 1980. Thus, between 1965 and 1980, the supply of dentists in Michigan is expected to increase by about 30 percent, while national estimates project an increase in effective demand for dental services of from 75 to 100 percent in the same period. Whether the future supply of professional manpower will be able to meet the demand for dental health services depends upon the way that dental practitioners organize the delivery of dental health services to the public.

Evidence suggests that for the foreseeable future the majority of dental services will be provided in private dental offices, although there is a slight trend toward more partnerships among two or more dentists including at least one specialist, and to group practice. Remarkable increases in productivity of the dental profession have been achieved over the past ten to fifteen years through improved techniques and more extensive and efficient use of auxiliary personnel. Informed analyses of the dental manpower needs of the future suggest that productivity gains will continue to be achieved by development and

application of improved equipment, office design, and techniques. Even greater improvement in the efficiency of dental practice may be achieved through the more widespread utilization of dental auxiliaries, and the extension and expansion of the functions performed by the auxiliaries.

There exist several potential obstacles to the greater utilization of auxiliaries in the provision of dental services. The most obvious is the restrictive nature of state licensure acts, which at present prevent delegation of certain relatively routine functions to the dental auxiliary. Dental educators and other leaders in the dental profession, on the basis of data from several experimental programs, believe that dental auxiliaries can be trained to perform in greatly expanded capacities. The Board of Trustees of the Michigan Dental Association has currently under consideration proposals for revision of the dental practice act in Michigan which would establish a second category of licensed auxiliary, the registered dental assistant or therapist. The duties of this auxiliary would encompass certain intraoral procedures now exclusively within the province of the dentist, thus freeing the dentist to concentrate more time on diagnosis, planning care, preventive services, dental health education, and the more highly technical surgical and other procedures for which only he is qualified.

Reassessment of dental practice laws is underway in a number of other states, and it may be expected that the next few years will see ammendments to these statutes in the direction expanding the scope of functioning of dental auxiliaries.

Apart from licensure strictures, other impediments to optimal utilization of auxiliaries include:

1. Attitudes of practitioners. Dentists may resist assuming the increased supervisory responsibilities incurred by enlarging their office staffs; they may not wish to delegate technical tasks they enjoy doing; they may be reluctant to incur the capital investment and increased overhead costs for the addition of one or more operatories. Furthermore, while recent dental graduates have been educated in the effective utilization of auxiliaries, dentists who have been out of school for 10 years or more did not receive such training and thus in the absence of continuing education efforts are unlikely to employ additional added auxiliaries or to employ them effectively.

2. Instability of the work force. Tradition has restricted entry to the dental hygienist and dental assistant occupations to women, with the result that there is a high turnover of young women leaving the field for marriage and family responsibilities. In addition, the rate of reentry of women to the field is lower than that for some other predominately female occu-

pations. It is probably because of low salaries in the case of the dental assistant but not the hygienist. High turnover rates plus the unavailability of replacements have tended to reinforce negative attitudes of some dentists toward the utilization of auxiliaries, especially the hygienist.

With respect to the dental laboratory technician, the development of formal educational programs is a relatively recent phenomenon, and the apprenticeship route to job skills is still prevalent. In addition to the two existing dental laboratory programs in Michigan schools, at least five community colleges have indicated intent to initiate programs by 1972. However, available evidence suggests that the employment market is somewhat restricted. Fewer than 50 firms in this field in Michigan employ as many as five technicians. There are also limited employment opportunities in private dental practices, where an individual dentist, or more likely two or more dentists, may employ a technician who performs under the direct supervision of the dentists. Dental laboratories typically operate with highly specialized division of labor, and some laboratory owners have been reluctant to hire graduates of formal educational programs because they lack highly specialized skills, or have been willing to hire them only at apprenticeship wages. However, the feeling has been expressed that the graduate of a formal program has a greater potential for advancement to a managerial position.

As a result of increasing interest and involvement of the dental profession in Michigan, in particular the local or component dental associations, there has been a rapid increase in the number of dental auxiliary programs offered by Michigan community colleges, and pressures to add to these numbers is building. However, the proliferation of new programs is not in itself a solution to the manpower problem. The shortage of qualified faculty, alone, is a strong reason to resist adding many new programs in the near future. A careful analysis should be made of statewide and areawide needs; this effort should include assessment of student and faculty recruitment potential, employment opportunities and availability of dental patients in sufficient numbers and variety to provide adequate clinical experience. Moreover, dental auxiliary education, as compared to other community college offerings, is relatively expensive, in terms of both initial capital outlay and operating costs. Therefore, planning efforts would also need to identify sources of financial support for program development.

With respect to measures dealing with faculty shortages, the University of Michigan is one of three universities in the nation which, with the aid of Kellogg Foundation grants, have developed the first graduate education programs specifically designed to prepare dental hygienists for careers in teaching. The University of Michigan program, which was developed jointly by the Dental School and the School of Education has been producing 3-4 master's degrees per year.

Recommendations

A. Education

1. The growing gap between the growth rate of dentist manpower and the rate of increase in demand for dental health services points to the need to expand further dental education facilities in Michigan beyond the planned expansion at the University of Michigan. Therefore, planning for a third dental school in Michigan should be initiated. The preferred site would be a university with a medical school, in order that faculty and facilities in the basic sciences might be jointly united.

2. The State Board of Education should defer action on new program requests for dental auxiliary education pending a detailed analysis of statewide and regional needs and assessment of the impact on curriculum design and program structure of extension of the duties of existing auxiliaries as well as of the proposal for a new type of registered dental assistant or therapist. The State Board should request staff ot the Bureau of Higher Education to work with the Special Committee on *Auxiliary Education Programs*, the staff of the Education for Health Care Project, and other appropriate groups in order to develop such an analysis.

3. The State Board of Education should encourage efforts to strengthen existing dental auxiliary programs in the direction of improving student recruitment and selection and reducing student attrition. Where a high drop-out rate is associated with two-year dental assistant programs, consideration should be given to consolidating these curriculums to one academic year in length.

4. Multiple approaches to the problem of faculty shortages in dental auxiliary education are needed, including expansion of the graduate program in dental hygiene at the University of Michigan; development of additional graduate education opportunities for dental auxiliaries in other Michigan institutions; and development of programs at the baccalaureate level to provide graduates of associate degree and certificate programs the basic preparation for teaching in dental assisting and dental hygiene curriculum.

B. Utilization

1. The State Board of Education should support and encourage the efforts of the Michigan Dental Association to stimulate

action by the state legislature to amend the dental practice act in order to permit greater delegation of functions to dental auxiliaries, and to establish a second category of licensed dental auxiliary.

2. Continuing education programs for practicing dentists, which have been conducted in Michigan for many years, need to be expanded and improved. This will require greater financial investment in the program and a more formal organization. The resources of both the Comprehensive State Health Planning Commission and the Michigan Association for Regional Medical Programs should be explored as offering possible financial support and an administrative framework for such efforts.

3. The dental schools and the other institutions offering dental auxiliary education programs, the dental association, and the dental auxiliary organizations should jointly plan a continuing education program for dental auxiliaries directed toward both refresher training and upgrading of skills and knowledge for persons employed in the field and those wishing to reenter. Such continuing education efforts should be coordinated with those for practicing dentists in order to improve the effectiveness of the dental health team.

C. Recruitment

1. Efforts should be made to recruit males into the dental hygiene field and into the emerging occupation of registered dental therapist. These efforts must include steps to strike down the sex barriers tradition has erected in educational programs and in the work situation. Similarly, dental schools should seek to recruit more women to prepare for careers as dentists.

2. Dental auxiliary education programs should actively seek to recruit from older married women who wish to reenter the work force or are seeking "second careers."

D. Needed Research

1. The entire problem of dental specialists needs in-depth study; attention should be given to the shortage of dental faculty in specialty areas; estimates should also be made of the numbers and types of dental specialists needed to meet future dental health requirements.

2. Exploration of the need to expand Michigan's dental education facilities should include consideration of the question of transferring the University of Detroit dental program to

Wayne State University to be integrated into the latter's medical center development, a precedent for such action is furnished in the transfer of Loyola University of New Orleans School of Dentistry to Louisiana State University.

DIETITIANS, NUTRITIONISTS, AND FOOD SERVICE SUPERVISORS

Introduction

Dietitians assume the major responsibility for food preparation and management of food services and nutrition education of patients and families in hospitals and other public and private institutions. Nutritionists plan and conduct programs concerning food in relation to health; they function in three principal areas: public health, teaching, and research. The food service supervisor, an emerging occupational category at the subprofessional level, exercises first line supervision of the food service staff in hospitals, other health institutions, and in commercial establishments.

There is no state licensure of dietitians, nutritionists, and food service supervisors. The American Dietetic Association (A.D.A.) has established, as of June 1, 1969, a professional voluntary registration, qualifications for which include completion of a baccalaureate degree in foods and nutrition or in institutional management from an accredited college which includes minimum academic requirements established by the A.D.A., as well as a one-year approved dietetic internship following the baccalaureate degree. Three years of preplanned experience under the supervision of a dietitian who is a member of the Association will also qualify a dietitian for registration. Membership in the A.D.A. is a prerequisite for registration under either alternative. Dietitians meeting registry requirements are designated as registered dietitians (R.D.). To maintain registration, the dietitian will be required to complete a total of 75 clock hours of continuing education every five years. Professional status as a nutritionist usually requires academic preparation at the graduate level - the American Public Health Association recommends an advanced degree in nutrition.

A small percentage of food service supervisors belong to the national association, The Hospital, Institutional, and Educational Food Service Society - sponsored by the American Dietetic Association; eligibility for membership includes completion of approved training at the post-secondary level.

Nutritionists represent a very small percentage of the total number of professionals in this field; A.D. membership data for 1967 reveal a

total of 36 nutritionists active in Michigan, of whom over 50 percent were employees of governmental agencies.

Dietitians and food service supervisors clearly represent the greatest numbers engaged in health settings at the professional and subprofessional levels. In 1967 there were a total of 433 dietitians (A.D.A.) employed in Michigan, of whom 300, or 69 percent were employed in health settings. However, it is significant that employed dietitians represented only 61 percent of the total A.D.A. membership in the state. The remaining 39 percent were presumably homemakers who were not seeking employment or who were unable to find institutional staffing patterns flexible enough to allow for a desirable combination of work situations with family responsibilities.

Apparent confusion as to nomenclature of persons employed in food service management in hospitals at less than the professional dietitian level makes it difficult to estimate the number of persons functioning as food service supervisors in Michigan hospitals. Based upon the Michigan Hospital Association's 1966 survey an estimated 400 to 450 persons were employed in this category in 1966.

Educational Trends

Eight Michigan institutions offer undergraduate majors in foods and nutrition and/or institution management to prepare dietitians and nutritionists. Three universities offer graduate programs in foods and nutrition, with a home economics emphasis, and one has a graduate program in institution management. Dietetic internship programs are offered at Harper Hospital and Henry Ford Hospital and the University of Michigan hospital; in 1967-68, a total of 48 interns were enrolled in the three programs. The University of Michigan School of Public Health offers the only master's degree program in public health nutrition in Michigan.

Ohio State University is offering an integrated, undergraduate program in medical dietetics, which consolidates the training period of hospital dietitians from five calendar years to four calendar years by utilizing summer periods. This program combines the academic facilities with a clinical environment of a health center. Michigan State University School of Home Economics is studying the current educational methods in dietetics with the eventual goal of an undergraduate program which will integrate clinical experience throughout the academic training.

Educational programs for food service supervisors are in a transitional period. The earlier post-secondary educational programs in vocational high schools are being superseded by two-year training programs

offered in junior and community colleges. Eight Michigan institutions offer the two-year Associate Degree program in Food Service Supervision. None of these programs is oriented specifically toward hospital and health facility settings, and only the Ferris State program is placed within a division of health sciences.

The A.D.A. sponsors a one-year correspondence course for food service supervisors designed primarily for rural areas where there are no other educational opportunities. Short-term educational programs for hospital and nursing home personnel are offered by Michigan State University and by Oakland Community College, and substantial numbers of food service personnel employed in those settings enroll in these programs each year. Northern Michigan University offers a one-year food service aide program combining instruction with on-the-job training in a variety of institutional settings, including the hospital.

There is a considerable demand for qualified classroom dietitians in Michigan, as indicated by the AHA survey of 1966, which identified the need for 146 additional dietitians in order to afford optimum care in hospitals throughout the state. Shortages of trained food service supervisors follow the same trend, with many more job opportunities available than there are graduates from Michigan's training program.

It can be expected that the impact of Titles XVIII and XIX of the Social Security Act will be to increase the demand for dietitians. Extended-care facilities, in particular, lack professional dietetic services. A growing number of these facilities which are certified for payment under Title XVIII are utilizing dietitian consultants on a part-time basis. As a result, previously inactive dietitians are being recruited back into practice.

The application of a systems analysis approach to the organization and staffing of hospital dietary departments has developed improved models for determining staffing requirements for dietary personnel. An example is a dietary methodology manual and accompanying services developed by one consulting firm which is now being used by several thousand hospitals throughout the country. Continued emphasis on improving utilization of dietary personnel would appear to be the most likely means of reaching a solution to the manpower shortage of professional dietitians, at least in the short run. Improved utilization cannot be achieved without an adequate supply of trained subprofessionals, including food service supervisors and dietary technicians, who can relieve the professional dietitian of routine functions. Thus, the professional skills of the dietitian can be more appropriately utilized as a member of the health care team in collaboration with the physician.

Recent Congressional investigations have focused attention on nutritional deficiencies suffered by significant segments of the nation's population. In addition, the U.S. Public Health Service is currently

conducting a national nutrition needs of all segments of the population. It is reasonable to anticipate more emphasis on nutritional services in public health and social service programs as a result of these inquiries. At present, services of professional nutritionists are more likely to be available to persons being served by maternal and child health and well baby programs. Typically, prenatal clinics in hospitals or other private or public agencies have a nutritionist on the staff or as a consultant, who serves the clientele of the clinic or agency. Several agencies providing such services have experimented with the development of subprofessional aides who can extend the services of the professional nutritionists through such activities as home visits and conducting demonstrations in food shopping and food preparation. Training of these aides is usually conducted by the employing agency, although in the case of a home management advisor program developed by the Detroit OEO, the original group of women were trained in a 16-week program conducted by the Merrill-Palmer Institute.

Recommendations

1. Michigan State University should be encouraged to continue its exploration of possible changes in educational methods in dietetics, including integration of clinical phases into the academic sequence with possible consolidation to less training time.

2. Both the academic and clinical phases of the education of dietitians should undergo continuing evaluation to keep pace with new knowledge in the field and with changes in the organization of health services. Indicated areas for increased emphasis are public health, social sciences, management techniques and systems analysis.

3. More graduate education for hospital dietitians should be encouraged in order to better qualify the dietitian to function as consultant to the physician; in particular, there is need for at least one graduate program in nutrition, emphasizing the hospital setting.

4. Manpower needs in health settings at the level of food service supervisor call for expansion of educational programs at the two-year level with greater emphasis on orientation to health facility settings, greater availability of short-term courses in adult education settings, and more in-service and continuing education by employing institutions.

5. The Michigan Department of Public Health should take a leadership role in promoting the development of one or more community based nutritionists in public or private voluntary agencies, i.e. local health departments, departments of social services, visiting nurse agencies, etc. Cooperation should be sought from the Nutrition Unit, School of Public Health of the University of Michigan; the nutrition section of the Michigan Public Health Association; and the Michigan Chapter of the American Dietetic Association.

ENVIRONMENTAL HEALTH MANPOWER

Introduction

Health professionals are faced with expanding and new challenges to man's health from his environment. A recent analysis of health problems facing the United States in the 1970's identified six main areas under which specific environmental problems may be grouped: water resources, air resources, food and pharmaceutical resources, ionizing and other forms of radiation, human settlements and residences, and solid wastes and general sanitation. The multi-dimensional nature of these problems and their tendency to overlap and interact require a wide variety of professional and technical skills. The diversely trained personnel who work on these can be collectively termed environmental specialists. This category includes such personnel as biologists, chemists, ecologists, all types of engineers, epidemiologists, hydrologists, limnologists, meteorologists, microbiologists, pharmacologists, physicists, pathologists, physiologists, sanitarians, and toxicologists, as well as administrators, analysts, dentists, information specialists, nurses, physicians, statisticians, and veterinarians.

This study, however, limited its coverage to the following specific occupational areas within the broad umbrella of environmental health specialties: safety engineer, sanitarian, environmental (sanitary) engineer, industrial hygienists, radiological health specialists and health physicists. These professional areas have in common the fact that all persons engaged in them are concerned with environmental health problems, and also share to some extent in common bodies of knowledge. Minimum educational requirements for these professions are a bachelor's degree in one of the biological or physical sciences or in engineering. The attached table sets forth the basic academic and experience requirements in each of these six areas.

Trends Having Implications for Educational Programs

Within these fields, certain trends are evident. There is a high demand for qualified graduates from both government and industry. Increasingly, employers are seeking persons with graduate study in such

areas of specialization as air pollution, industrial hygiene, radiation science, water resources and sanitary sciences. Environmental health programs of the future will require the services of personnel more highly trained than they are today; at the same time, lesser trained persons at the technician level are increasingly needed to perform routine duties in laboratories and in monitoring and inspection functions.

Because government at all levels represents the chief employer of environmental health personnel, efforts to improve utilization of professional manpower may be impeded by rigidities of civil service classification systems. In a number of states, a B.S. degree is required for sanitarians although many functions traditionally ascribed to this position could be delegated to technicians. The Michigan statute requires a B.S. degree plus 3 years of experience for licensure, but does not prohibit unlicensed persons from working in the field.

Michigan colleges and universities offering educational programs in environmental health specialties all report a greater demand for graduates than the institutions can supply. At present, the limiting factor in output for all of the areas is the number of students who elect to go into these fields rather than a lack of training facilities or faculties. Ferris State College is the only school in Michigan that has a formal undergraduate program in environmental health. Ferris, one of about nine schools in the country offering such a curriculum, has both a four-year program, graduates of which earn the B.S. degree, and a two-year course which terminates in an A.A.S. degree and which prepares environmental technicians. Most of the graduate education in the environmental health fields is available at the University of Michigan, which has the state's only school of public health. The availability of a number of related graduate and graduate-professional resources at the University of Michigan has made possible development of a number of interdisciplinary environmental programs involving cooperative efforts of the School of Public Health, the Medical School, the College of Engineering, and the School of Natural Resources. Increasingly, the complexities of problems involved in maintaining and improving the quality of man's environment will call for contributions from a broad spectrum of biological, physical, and social sciences.

Environmental health manpower is a relatively small proportion of all health manpower, but the contribution of those engaged in the many-faceted aspects of environmental control is crucial to the health and well-being, indeed perhaps the survival, of the human population.

Recommendations

1. Recruitment into educational programs in environmental health is a crucial factor in meeting manpower needs. The Michigan Public

Health Association, the University of Michigan School of Public Health, Ferris State College, and the Michigan chapters of the professional associations representing environmental health specialists should jointly plan and implement an effective recruitment program.

2. A statewide committee representing governmental agencies at all levels that utilize environmental health manpower should study patterns of utilization of such manpower with a view to developing more effective patterns of utilization.

3. A pilot program to train environmental health technicians should be undertaken by a community college with appropriate academic resources in such areas as biology. Assistance should be sought from, among others, the University of Michigan School of Public Health, Ferris State College, the National Sanitation Foundation (headquarters in Ann Arbor) and the Michigan Department of Public Health.

HOSPITAL-BASED TECHNICIANS

Introduction

With the expansion of hospitals in the last several years and the impact of technological change in the health field, many new hospital-based technicians have come into existence to operate the recently developed types of complex equipment. These aides, for the most part, are either working with machines designed to assist the patient in functioning, such as the heart pump and kidney pump, and oxygen equipment (inhalation therapist) or are involved with operating apparatus of a diagnostic nature, like the electrocardiograph and electroencephalograph machines. Also included among the group would be the surgical technician, whose duties include not only caring for and maintaining sterile and unsterile supplies and equipment in the operating and delivery rooms, but assisting in the care of patients undergoing surgery. Unlike most of the laboratory personnel in a hospital, all of these technicians, to various degrees, have direct contact with patients.

Trends Affecting Educational Planning

For the educational programs requiring less than two years of training, the requirement that the intricate and expensive equipment be available at the educational setting has contributed to the continuation of instruction in the hospitals, usually on-the-job. These positions would include both the electrocardiograph and electroencephalograph technicians, surgical technicians, and heart and kidney pump operators.

As these technicians have assumed increased responsibilities for the patient's well-being in the hospital setting, there has developed a trend towards the establishment of certification programs and professionalization for various types of technicians. Since 1960 the EEG technicians have been organized as the American Society of Electroencephalograph Technicians (A.S.E.T.) and a limited program of certification has existed since 1966 through the American Board of Registration of Electroencephalograph Technicians. It is quite likely that the electrocardiograph technicians may follow suit within the next few years and establish as professional organization with a limited program of certification.

The surgical technician, also referred to as surgical aide, surgical technical aide, or operating room assistant, is also generally trained by the employing institution; such training varies widely as do the functions assigned to this occupation by the employing institution. There has been recent interest in formalizing the training content for the surgical technician and developing a basic curriculum, but there is no unanimity of opinion as to whether such a curriculum should be relatively brief and based in a vocational-technical school or might be broadened to a formal community college AA degree program, as proposed by the Health Careers Project sponsored by the New York State Department of Education. Several community colleges in Michigan have expressed interest in developing programs in the surgical technician area, but none as yet has been formally implemented.

The heart pump and kidney pump (hemadialysis) technician are typically trained on-the-job by the employing institution. Generally speaking, such technicians are found only in larger hospitals and even those rarely have more than four or five such technicians employed in any one hospital. Most hospitals train these technicians specifically to operate either the kidney pump or the heart pump machine, although in some hospitals outside of Michigan there have been efforts to train persons to operate both of these machines. An Association of Extra-Corporeal Circulation Technicians has been formed, but the group has not moved to develop a formalized program of certification for either heart pump or kidney pump technicians. There has been some interest in the possibility of a basic training program to qualify a technician to operate several machines, for example, in the dual capacity as a heart and kidney pump technician or as both an EEG and EKG technician. A consortium of 30 hospitals in one major mid-west city has been developing a proposal to institute a training program for the extra-corporeal technician in one of the community colleges in the area. If community colleges are to move into the area of educating specialized technicians of the nature of heart pump and kidney pump technicians, there would seem to be a rationale for broadening and enlarging the scope of the training to produce a more versatile technician.

Unlike the heart pump and kidney pump functions, the administration of oxygen and other gases for medical purposes is an important function in hospitals of all sizes. The extensive responsibilities involved in handling oxygen and other gases and the equipment for their administration has led to the development of a relatively new occupational area known as inhalation therapy. Most of the educational programs are hospital-based and the minimum training period is now 18 months. The AMA Council on Medical Education accredits training programs, and graduates of approved programs are eligible for registration through the American Registry of Inhalation Therapists. In an attempt to determine the proportion of registered to non-registered inhalation therapists in Michigan hospitals, project staff analyzed data worksheets from the American Hospital Association conducted in 1966. On a full-time equivalent basis, 19 percent of the total designated as inhalation thera-

pists in Michigan hospitals were registered as of April, 1966. A few programs in inhalation therapy have been established in community colleges, and, with the upgrading of requirements from 12 to 18 months of formal training, most of these programs have become associate degree programs. Washtenaw Community College initiated the first approved inhalation therapy program in Michigan in 1966; Highland Park and Macomb Community Colleges started new programs in fall, 1968. All three are two-year, associate degree programs. Inhalation therapy is an area of manpower shortage, to the extent that graduates of accredited schools of inhalation therapy are in high demand and tend to quickly move into supervisory or administrative positions. Unmet demands for inhalation therapists have made it possible for a great many persons who have been trained in on-the-job or other informal capacities to function in the field. In smaller hospitals the inhalation therapy functions are frequently performed by such diverse personnel as aides, orderlies, licensed practical nurses or registered nurses.

Some persons in the field see the likelihood of baccalaureate programs developing in inhalation therapy, perhaps in the early 1970's. These will not develop until the present acute shortages of persons with even one or two years of formal training is overcome. It is also felt by many persons in the field that the way to increase the supply of formally trained therapists is through the expanded enrollment in quality programs rather than by proliferation of smaller programs.

Recommendations

1. Further data and evaluation of the existing training programs for heart and kidney pump technicians in Michigan hospitals are needed. The Michigan Association for Regional Medical Programs might take a leadership role in exploring the question of whether more effective training of these technicians should be developed through the pooling of the resources of several hospitals now engaged in training these personnel. This inquiry might include exploration of the question of a combined training program to qualify persons in the operation of both types of equipment.

2. The question of developing a basic training course for aides and technicians functioning in the operating room should be explored with a view to locating the didactic portion of such training in a vocational education setting, to be followed by a short, on-the-job training course by the employing agency.

MEDICAL LIBRARIANS

Introduction

Medical librarians are professional librarians who have successfully completed either approved courses or internship in medical librarianship.

Reliable estimates indicate that the total number of medical librarians in Michigan in 1968 was 35. Most medical librarians work in resource libraries located in large medical centers. A small number are employed by major teaching hospitals and by large pharmaceutical firms.

There are a large number of non-professional personnel with varied qualifications employed as chief librarians in hospital health science libraries in Michigan. The importance of their function coupled with the demand for this type of service indicate that hospital health science librarianship is not an emerging occupation.

Education in medical librarianship is limited in Michigan. To date it has consisted of two approved courses in medical bibliography which were taught during the summer sessions of 1966 and 1967 at the University of Michigan; and a post-masters training program at Wayne State University for academic years 1967-68 and 1968-69. Continuance of the latter program at WSU is contingent on the renewal of the U.S. Public Health Service Grant that has supported the program to date.

Available evidence indicates that additional program offerings are necessary both to educate competent medical librarians and to meet existing and future demands for this type of personnel.

Trends Affecting Educational Planning

The amount of research and the production of clinical and scientific literature has increased dramatically in the past and continues to rise steadily each year. The total number of biomedical journals exceeds 10,000 and the annual production of biomedical literature exceeds five million pages. Though this has and will continue to expand, in gross terms, the work load of medical librarians, it affects more importantly the utilization pattern of the health science library. The growth in knowledge has led to increased specialization in health fields,

emphasis on continuing education, and the institution of post-graduate education, particularly for physicians; the demands for access to the scholarly record have increased and become more specialized. It is important to note that physicians and other health professionals are placing increased reliance on the access to information for the support of direct health care. Thus, the medical librarian is in the position of mediating between a growing and more specialized scholarly record and the increased demands of greater numbers of health personnel. As this trend continues it will have the obvious impact of increasing the number of medical librarians required to serve library users and will contribute to the need for personnel with more specialized training.

The large and increasing body of biomedical information has made it manifestly impossible for all but a select few institutions to maintain complete library collections. It has been viewed as essential, therefore, to organize a statewide library system which will provide hospital health science libraries with access to the information contained in Michigan's resource libraries. Planning for a regional medical library program in Michigan has been undertaken by the Michigan Association for Regional Medical Programs. The project proposal, now in draft form, would link hospital health science libraries to the major facilities at Michigan State University, Wayne State University, and the University of Michigan. Using interlibrary loan and document duplication procedures, its ultimate purpose is to open the resources of these major libraries to all qualified health professionals and students in Michigan.[1]

To adequately staff a regional medical library system such as the one planned by the MARMP will require at least seven full-time medical librarians. This requirement alone would necessitate at least a 20 percent increase over 1968 supply of medical librarians.

To function properly, a regional medical library system will also require that in each affiliated hospital there be a competent librarian to utilize the system; to maintain a small collection of essential materials; and through these means meet the information demands of professional health personnel. This may require as many as 150 additional such personnel in Michigan. In most cases these individuals will not be professional librarians but hospital health science librarians.

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[1]A regional medical library organization sponsored by the National Library of Medicine was funded on January 1, 1969, and began operation on April 1, 1969. Michigan, Ohio, and Kentucky comprise the East Central Region. The medical library at Wayne State University School of Medicine serves as the administrative unit for the region. This organization is different from but related to the proposed regional medical library program described in this report.

Although the demand for this type of worker indicates that it will be a permanent occupational category, the proper educational program for this position has not as yet been determined. For at least the next five years, training in this area will be accomplished largely through conferences, workshops, and by on-the-job programs.

Recommendations

1. The State Board of Education should request Wayne State University and the University of Michigan to undertake programs in medical librarianship through their graduate schools of library science by enlisting the cooperation of the professional medical library personnel at their respective medical libraries and by obtaining the federal financial support available under the education sections of the Medical Library Assistance Act of 1965.

2. A program for the continuing education of medical library personnel should be established in Michigan. The program will need to be developed under the auspices of the University of Michigan and Wayne State University, as the two institutions with both primary resource libraries in health science and educational programs in library science.

3. Organized programs to provide training for the emerging occupation of hospital health science librarian should be established. At this juncture, lacking clear standards for program training for program development in this area, a joint planning effort should be undertaken by the state hospital associations, in consultation with educators in the field of medical library science.

4. The plan to establish a Regional Medical Library Program in Michigan represents a forward step in making biomedical information available to health care professionals and institutions around the state. The State Board of Education should encourage appropriate educational institutions throughout the state to cooperate with this planning effort as it develops.

MEDICAL ENGINEERING

Introduction

Bioengineering (bio-medical engineering) is the application of methods of technological research to living systems. It is a relatively new field which is adding research, diagnosis and therapy of many diseases and disorders. Essentially it is the application of engineering principles to the sciences of medicine and biology. Typical activities in this field include the development of new instruments for use in patient care or in research, the invention and perfection of orthopedic and prosthetic devices and appliances, and the adaptation of computer technology and bioengineering methods for research use in medicine and biology. This work is being conducted in hospitals, scientific foundations and electronic and instrumentation industries.

Educational Trends

As a defined field of education and research, bioengineering has been developed since World War II. For the most part, bioengineers have emerged from engineers graduating in the usual academic engineering disciplines but some bioengineers enter the field with educational backgrounds in medicine, biology, and other life sciences, and this trend may increase.

The University of Michigan is the only school in Michigan which offers a graduate program in bioengineering. Wayne State University in March of 1966 offered a 10-week course in bioinstrumentation, but has been unable to offer it again.

The U-M curriculum is an interdisciplinary curriculum, though it is located in the College of Engineering. It was begun in the fall of 1963 to combine studies in any area of engineering with those of the medical and biological sciences. Both a Master's and a Ph.D. degree in bioengineering are offered. In September, 1967, there were approximately 40 students in the program who came from a wide range of undergraduate backgrounds, mostly from the engineering disciplines, but including one medical doctor, and a scattering of mathematicians and unified science students.

Biomedical Engineering Technicians are responsible for assembling, adapting, operating, maintaining and repairing many new kinds of mechanical, electrical and electronic medical devices and instruments.

Courses in biomedical engineering technology are being developed by some technical institutes to supplement on-the-job training. There are as yet no programs being offered in the junior or community colleges in Michigan. The Foundation for Medical Technology has prepared a draft curriculum for technician or laboratory assistant in Medical Electronics or Biomedical Technology. Content suggested at the high school level includes chemistry, physics, biology, mathematics (through beginning calculus), drafting, laboratory, instruments and techniques, electrical measurements and devices; in addition, at the college level, should be added mechanical drawing, scientific instrument design, test calibration and repair, medical technology and engineering. As more Ph.D.'s in biomedical engineering enter teaching or professional service and research programs continue to produce exciting new advances in medical technology, some observers foresee a rapid increase in qualified students entering the field and in the amount of money available to support research and graduate education. A recent study of trends in bioengineering concluded that it will be one of seven new industries surpassing the billion dollar mark in the 1970's.

Recommendations

1. As a highly complicated, sophisticated, and rapidly changing field, medical engineering education should be undertaken only by developed universities with considerable depth of graduate program offerings and an extensive medical center. Concentration on quality programs and improved recruitment into those programs should meet the foreseeable demands in this highly specialized field.

2. Similarly, development of technician level training programs in this area should proceed cautiously and probably should be initiated by or developed in close cooperation with a university medical center, since biomedical technology relies heavily on practicing skills within a clinical setting.

MEDICAL LABORATORY PERSONNEL

Introduction

In addition to clinical pathologists, over 100,000 persons in the United States are employed in various occupations providing some form of services within a clinical laboratory setting. Four major occupations have emerged -- medical technologist, cytotechnologist, laboratory assistant, and histologic technician -- all of which have certification programs of some sort established through joint programs sponsored by the American Society of Medical Technologists, the American Medical Association's Council on Medical Education, and the American Society of Clinical Pathologists (A.S.C.P.). Other more recently developed laboratory technician fields include nuclear medical technologists, blood banking technologists, and specialist certifications in such areas as microbiology and chemistry. To date, however, few persons have been certified in any of these newer areas.

The core of the laboratory personnel is made up primarily of medical technologists and laboratory assistants. The medical technologist works directly under the clinical pathologist and is trained not only to perform virtually every laboratory procedure, but may also function as a supervisor of other technicians or as instructor in one of the hospital-based programs for technical training.

The cytotechnologist, though a comparatively new member of the laboratory team, performs a valuable service employing laboratory techniques in the detection of body cell changes important in the early diagnosis of cancer. This occupation came into being through the development of the Papanicolaou smear as a test for the early detection of cancer.

Length of training for these different areas varies: four years for the medical technologist (three years of college leading to a baccalaureate degree plus 12 months of clinical training in an AMA-approved hospital school of medical technology); three years for the cytotechnologist (60 semester hours of approved pre-clinical training in a college plus 12 months of clinical training in an approved hospital-based cytotechnology training program; two-years for the medical laboratory technician (a new educational sequence approved by the A.S.C.P. October, 1968, to be based in the community college); one-year in a hospital-based program for the certified laboratory assistant; and one year of supervised training (without formal curriculum) in a clinical pathology laboratory for the histologic technician.

Trends Affecting Educational Planning

There are tremendous shortages of all laboratory personnel, particularly for certified medical technologists. The AHA-PHS Survey of 1966 estimated additional needs for laboratory personnel in Michigan hospitals of nearly 600 technologists and technicians. Over two-thirds of this figure represents the need for additional medical technologists. This estimate does not take into account personnel needs of private, independent laboratories, state and local health departments, industry, and independent research organizations. With increasing reliance upon laboratory tests in routine checkups as well as in the diagnosis and treatment of disease, it may be expected that the demand for clinical laboratory personnel will continue to increase. Moreover, it may be expected that the impact of automation and other technological advances will affect changes in clinical laboratory procedures, and thus in the education and training required for both professional and subprofessional personnel.

Clinical laboratory services tend to be dominated by females; because of the recency of the tremendous growth in this area, there is a high rate of turnover in the work force as young women leave their jobs for marriage and family obligations. A study of alumni of the Michigan State University program indicated a very high attrition rate among recent graduates, although not enough years had elapsed since any of the students had graduated to determine what percentage of them will return to the field after their children reach school age.

Within the educational program itself, three major problems may be identified:

1. There is a high drop-out rate among the medical technology enrollees who do not complete the four-uear curriculum. While many factors undoubtedly contribute to this high rate, the disjunctive nature of the medical technology curriculum is probably a major factor. Many students drop out in third year, preferring not to relocate in the hospital-based program for their fourth year. One response to this problem has been to designate medical technology coordinators on the campuses of affiliated colleges, in order to orient premedical technology students to clinical applications of their academic study. Another approach has been the development of integrated, university-based programs with innovative curriculums which do not conform to the required 12-month clinical training period. Special approval has been granted to a number of pilot projects conducted by universities throughout the country.
2. There seems to be a wide variation in the quality and depth of the preclinical education offered by the various affiliated colleges and universities. A national study of medical technology education reported weaknesses in medical technology education that included insufficient preclinical preparation in certain of the basic sciences. The study recommended strengthening of preclinical programs through increased emphasis on microbiology, biochemistry, physics and mathematics. However,

a careful review of the program offerings in medical technology degree programs in institutions of higher education in Michigan, through a perusal of the catalogues, revealed that the majority of these institutions do not have a depth of offerings in most of these subject areas. Moreover, most of the institutions not only did not require more than a minimum of course work in these fields, but lacked the facilities to offer more extensive work in one or more of the areas. Only the larger state institutions (Wayne State, Western Michigan, Michigan Technological, and Michigan State Universities, the University of Michigan and Ferris State College) provide an in-depth selection of course offerings in these areas.

3. Many of the hospital-based clinical programs have very small enrollments and are presumably relatively inefficient. In December, 1968, the AMA accreditation standards for the hospital schools were amended to require all new schools of medical technology to have an affiliation with a college or university leading to a baccalaureate degree and a minimum capacity of ten students. (This does not apply to schools already in existence.) All of the 36 hospital schools in Michigan are college or university affiliated, but 11 of them have a capacity of fewer than eight students. More important, all but one of the 36 hospital schools in Michigan failed to enroll to full capacity in either 1965-66 or 1966-67. Academic year enrollments average just over 50 percent of the total capacity of these schools.

There is one hospital-based school for certified laboratory assistants in Michigan, at St. Joseph's Hospital, Mt. Clemens; in addition, two educational institutions -- Highland Park College and Northern Michigan University -- offer a two-year program, combining the hospital training for the C.L.A. with related academic instruction, culminating in an Associate Degree. Until October, 1968, when a new category of medical laboratory training was identified by the American Society of Clinical Pathologists, the role of the community college was hampered in developing laboratory personnel since the only program until then that fell within the two-year training time of the community college was the Clinical Laboratory Assistant. Because the CLA was specifically designed as a hospital-based program it was not readily adaptable to the community college and although a few community colleges in the nation attempted to offer the CLA it has not proved successful in this setting. At their October, 1968 meeting, the American Society of Clinical Pathologists Board of Schools adopted standards and requirements for the new certification, Medical Laboratory Technician. It appears the CLA programs will continue at the post-secondary level with the new two-year level of training for medical laboratory technicians introduced to community college planning to supply the much needed middle-level personnel in the medical laboratory.

There are three approved schools of cytotechnology in Michigan, at Harper Hospital, Wayne State University Medical School, and University Hospital, University of Michigan, the latter having been established within the last year. The program directors report that qualified student applicants far exceed the number of available places in their schools

and the requests for cytotechnologists far exceed the number of people trained each year.

Recommendations

A. Education

1. Efforts to improve the quality and effectiveness of existing educational resources for medical technology education should take priority over expansion of facilities in this area. These efforts should include:

   a. Measures by institutions offering pre-clinical training to upgrade the content of the science areas where these lag behind nationally recommended standards and to reduce the drop-out rate through improved selection and counseling. Those institutions lacking the resources to accomplish these aims should consider phasing out their program.
   b. Reorganization of clinical training in order to consolidate or phase out the smaller and inefficient hospital-based programs. In some cases, where there might be top-level instructional staff and excellent teaching equipment and facilities, hospital programs could be combined into a joint program in one geographical area rather than being phased out completely.

2. The State Board of Education should consider seriously placing a moratorium on approval of pre-clinical medical technology curriculums in community colleges, since this educational sequence increases the disjunctive nature of the medical technology education pattern, requiring the student to transfer twice in order to complete the four-year curriculum.

3. The State Board of Education should encourage the orderly development of two-year medical laboratory technician programs in appropriate Michigan community college settings in order to help meet the manifest demands for adequately trained technicians in the medical laboratory sciences. Michigan community colleges interested in initiating medical laboratory training programs should consult with the American Society of Clinical Pathologists Board of Schools to help them assess their resources for such programs (included would be strengths in basic sciences offered by the school and availability of adequate clinical facilities).

B. Utilization and Practice

1. The wide variation in educational background, training, and experience of present clinical laboratory personnel, coupled with the impact of continuing advances in medical technology, point to the urgent need to develop programs to upgrade the qualifications of existing laboratory personnel through additional institutional and on-the-job educational programs.

2. The high turnover rate in the medical technology field points to the need for measures to improve retention of trained personnel and for an active program of recruitment to reactivate inactive personnel; the latter effort should be coupled with programs of refresher training courses.

C. Needed Data and Additional Research

1. Accurate data on the numbers, qualifications, work setting, and work activity status of clinical laboratory personnel in Michigan are lacking. An effort should be made to develop more accurate manpower inventory data on medical technologists and other clinical laboratory workers.

2. More research is needed into the question of the manpower implications of automation, including the application of computer science to clinical laboratory operations. The question of establishing pooled resources among a network of smaller hospitals, particularly in the more sparsely populated areas, needs to be explored.

MEDICAL RECORD SERVICES

Introduction

Medical record personnel have four major responsibilities: (1) to assure that the institution has complete records on patients, including appropriate reports from attending and consulting physicians, pathologists, nurses, and other professional staff members; (2) to design and maintain a filing system capable of making these records immediately available; (3) to release information from the files to authorized personnel; and (4) to analyze the records, compile statistics, and develop clinical and administrative reports on patient care activities of the institution. Medical record personnel do not have direct patient care responsibilities.

These individuals are seldom licensed or registered by the state, but the American Association of Medical Record Librarians (AAMRL) has established standards for professional registration and maintains a list of registered record librarians (RRL) and accredited record technicians (ART). Nationally, membership in the AAMRL reached 7,732 in 1968; of this number, 4,701 were listed as active members, including 3,345 RRL's and 1,356 ART's. Comparable figures for Michigan are: 320 AAMRL members, including 181 active members, of whom about 140 are RRL's and the remainder ART's.

Accurate data on the number of persons functioning in medical records positions in Michigan are lacking; the 1966 AHA-PHS survey estimate of 235 medical record librarians (MRL's) and 414 medical record technicians (MRT's) employed in registered hospitals in 1966, exclusive of osteopathic hospitals, is probably low. Available data suggest that about 300 MRL's and about 600 MRT's are currently employed in Michigan; thus registered and certified personnel would represent about 47 percent of the MRL's and some seven percent of MRT's. If sufficient medical record librarian manpower were available, it is probable that about 450 MRL's could be employed. Evidence also suggests that an increasing number of medical record librarians work part-time in more than one hospital. Recently proposed changes in Medicare regulations governing standards for medical record departments in participating hospitals will permit a qualified medical record technician to function as head of a medical record department if the hospital has available regular consultation from a qualified medical record librarian. This policy should result in increasing part-time and consulting work by MRL's and may serve as a lever to open the

ranks of inactive MRL's whose family responsibilities preclude their returning to full-time, or even structured part-time, employment.

The Registered Record Librarian (R.R.L.) is required to have either a bachelor's degree in Medical Record Science or a bachelor's degree plus one year's training in an approved school of Medical Record Sciences and successful completion of the National Registration Examination given by the American Association of Medical Record Librarians. The technical level of training in Medical Records is designated as Accredited Record Technician. Training for the ART requires successful completion of an A.M.A. approved hospital-based program (9 to 12 months in length); or an approved two-year community college-based program, or successful completion of a 25-lesson correspondence course offered by the AAMRL; plus a national accreditation examination given by the AAMRL.

Trends

Some 23 colleges and universities in the United States now offer baccalaureate programs in MRS, reflecting a trend in this area toward higher educational requirements. Medical Record Librarians and Technicians are in short supply both nationally and in Michigan. Nationally, the annual number of MRL's graduating from approved programs in MRS has increased by only 41 percent between 1955 and 1968, from 137 to 193. Mercy College in Detroit, which offers the only MRL program in Michigan, awarded 6 baccalaureate degrees in medical records in 1968. Nationally about 240 graduates are projected for 1969.

Most MRT's are probably still trained in in-service or on-the-job programs; however, establishment of additional formal programs in educational settings can be expected to improve the quality of training of MRT personnel. The demand and the salaries for MRT's are high, and new programs are being planned for Michigan schools; thus the number of qualified MRT personnel can also be expected to increase.

The recent application of computer systems to medical record services is effecting changes in MRL's role, with greater emphasis being placed on the functions of retrieving and using information and participation in evaluation of patient care.

Recommendations

A. Education

1. Present availability of educational opportunities in medical librarianship in Michigan is inadequate to meet the manifest demand for trained personnel at the professional and technician

level. There is need for development of programs at both the two-year and the four-year and for experimentation over a broad range of different teaching methods aimed at discovering how best to meet the demand for trained personnel.

2. One or more public institutions in Michigan should offer MRL programs; as of now, approximately two-thirds of the programs throughout the U.S. are offered by private institutions in which tuition costs are high and the programs relatively small.

3. Because of the changing role of the MRL, educational programs must place greater emphasis on computer technology. Therefore, new programs should preferably be developed in institutions having computer facilities available. Wayne, MSU, and the University of Michigan are in a position to offer leadership, either by developing a program within the institution or by assisting another four-year institution to do so.

4. Upgrading of MRT training should be sought; this would call for establishment of more formal educational programs throughout the country, preferably in the community college setting. The experience of the first such program in Michigan, initiated at Schoolcraft College in the fall of 1968, should provide useful information to interested community colleges. Preliminary indications are that particular emphasis should be placed on adequate lead time to recruit faculty and to develop effective student recruitment to the program. The AAMRL recommends that programs be located where there are concentrations of medical care institutions; a college should have at least 4 or 5 accredited hospitals available in the immediate vicinity to provide suitable sites for students' clinical practice. An orderly development of community college programs in appropriate schools throughout the state should be encouraged by the State Board of Education.

5. Educational institutions which offer the medical record technician and medical record librarian programs, should provide evening and extended day programs, summer session programs, and other innovative educational designs for the benefit of those workers who wish to take their formal academic programs on a part-time basis, and thus advance professionally. Educational institutions, particularly the universities, should also serve as continuing education centers for graduates of the two-year and four-year programs, keeping practitioners up-to-date with changes in the field.

6. Whatever formal educational programs are established, it is essential that there remain many alternate paths to professional advancement. Recruiting must be accelerated among those persons

already in medical record work and among professionals in other fields, most of whom will have the opportunity to progress in medical records only through on-the-job training, short courses, proctorships, or correspondence courses. Persons already working in the field should not be expected to take a year or two to go back to formal schooling in order to advance in their profession.

B. Utilization

1. Sharing of computer services in medical record systems is a growing trend, especially among smaller hospitals which cannot feasibly develop their own automated systems. A similar sharing of the scarce professional skills of the medical record librarian should be explored. The Michigan Association for Regional Medical Programs might provide a source of financial support for a feasibility study or pilot study in this area.

2. Hospitals and other institutions utilizing medical record personnel should evaluate the organization of their medical record departments to assure optimal use of professional and technical manpower through appropriate division of labor between professional supervisory and administrative duties on the one hand and technical and clerical on the other.

C. Needed Research

Accurate data on the present supply of MRL's and MRT's in Michigan are lacking. Needed is information about the educational background, training and experience of the more than 50 percent of persons designated as MRL's who are not registered and the 90-plus percent of MRT's lacking certification. Distribution by age and sex is also lacking as is information on personnel turnover, extent of part-time employment, and percentage of inactive professionals and trained technicians.

MEDICAL OFFICE ASSISTANT

Introduction

The Medical Office Assistant has been traditionally the office assistant for private practicing physicians with duties ranging from receptionist, secretarial, and bookkeeper through assisting in patient examination, instrument sterilization, and simple laboratory tests performed in the physician's office. Trends in private medical practice indicate a move towards greater specialization among auxiliary personnel resulting in a division of responsibility. The American Association of Medical Assistants recommends training in two categories: the Administrative Office Assistant and the Clinical Office Assistant. The AAMA currently gives examinations for certification in each category. Course content in the curriculum designed for the administrative office assistant favors a heavy component of secretarial and office skills with emphasis on medical terminology and medical machine transcription enabling the trainee to function in the physician's office and in a number of other possible employment situations, e.g. hospital administration departments, medical records departments, governmental health agencies, and insurance firms -- especially those with medical insurance divisions. Course content in the curriculum designed for the clinical office assistant favors a moderate amount of general office skills with a heavy component of clinical skills, e.g. examining room techniques, preparation of the patient, vital signs, sterilization techniques, supplies, dressings and minor surgery, nutrition, drugs and their administration, injections administration, and simple laboratory tests.

Trends in Education

It appears that demand for the administrative office assistant will continue to increase as third-party payments increase in all medical offices, including offices of private practicing physicians, hospitals, clinics, nursing homes and extended-care facilities. The clinical functions formerly assigned to the office assistant appear more and more to be taken over by an auxiliary person who functions only in that capacity, e.g., a Licensed Practical Nurse or an Associate Degree Nurse with a resulting decrease in demand for clinically trained office assistants.

A common complaint of community colleges offering the training for

the medical office assistant is that students enrolled in such programs are usually employed before completion of the prescribed course of study. This occurs in both the one-year and the two-year programs and follows familiar patterns in other types of office and secretarial training in which the attrition rate is extremely high. Proprietary schools offer courses in medical office assisting beginning at three months with some courses extended through medical secretarial training at the two-year level. According to the Michigan Employment Security Commission, Detroit office, salaries vary according to length of training and experience in the field; the most desirable applicant is one with experience in the area of insurance forms. Job-entry salaries for new graduates start at $1.60 per hour; persons with some experience and willing to work unusual hours, e.g., night office hours and Saturdays, may start at $80 per week in the Detroit area. Ten of the twenty-six community colleges in Michigan reported having some kind of medical assistant or secretarial program with four others projecting such a program within the next few years.

Recommendations

1. Before approval of new programs in Michigan community colleges, the State Board of Education should determine an appropriate classification of course work now being offered under the broad area of medical assistant training. According to catalogues, wide variations occur between schools and between programs presently listed under the commonly used title, Medical Office Assistant.

2. The trend to third-party payments in the medical field indicates the need for specific course work designed to prepare medical office personnel to comprehend the complexities of insurance forms. The State Board of Education should explore the possibility of curriculum revision in already existing programs with the colleges offering such programs with requests for assistance from Blue-Cross Blue-Shield and Social Security Administration representatives.

MEDICINE AND OSTEOPATHY

Introduction

The physician occupies a pivotal role in the delivery of personal health care services both because he is the usual point of entry into the system and because he serves as an arbiter of the type and amount of health care services that may be provided by other health workers. Thus the supply and distribution of physician manpower has been a focal point of health manpower studies at both the state and national levels.

The problems and issues involved in medical education needs in Michigan were a central concern of the Citizens Committee on Education for Health Care from its establishment in 1966. The Citizens Committee was assisted in its deliberations by the advice and counsel of the Advisory Committee on Medical Education. Because urgent policy considerations required that full attention be given in the area of medical education, a series of separate reports and policy memoranda have been prepared on this question. Therefore, only a brief summary of the findings and recommendations contained in those documents will be included in this report. The following list includes the major reports and policy statements that have been prepared by the Citizens Committee, by its staff, and by the staff of the Michigan Department of Education relating to these issues:

1. "Additional Publicly-Supported Medical Education Facilities in Michigan", a memorandum from the Citizens Committee on Education for Health Care dated August 3, 1966. (processed)
2. *Recommendations Concerning the Proposal for a Full-Degree Medical Program at Michigan State University*, A Report to the State Board of Education by the Citizens Committee on Education for Health Care, Lansing: Michigan Department of Education. November, 1966. 53 pp.
3. "Report to the State Board of Education on Status of the Osteopathic Proposal", a memorandum from the Citizens Committee on Education for Health Care dated January 13, 1967. (processed)
4. *Osteopathy in the United States and Michigan.* A Staff Report from the Citizens Committee on Education for Health Care. Lansing: Michigan Department of Education. August, 1967. 106 pp.

5. "Response to the State Board of Education Concerning the Proposed Educational Program of the Michigan College of Osteopathic Medicine", a memorandum from the Citizens Committee on Education for Health Care dated February 13, 1968. (processed)
6. Michigan Department of Education, *A Report to the Legislature Regarding Medical Education in Michigan-Draft Report*, Lansing: January 24, 1969 (revised February 13, 1969). 14 pp.

Major Findings

1. Review of recent analyses of physician manpower need at the national level reveals consensus among health experts as to the need for a substantial increase in the total physician supply in order to meet the new demands that will be generated by population growth, increasing longevity, higher levels of personal income, increasing educational attainment, the removal of economic barriers to health care, and the expanding role of government in the financing of health services.

2. Michigan, as an industrialized state, ranking seventh in size of population and 12th in per capita income among the states, with a high level of unionization, and of health insurance coverage, with a Medicaid program now operative, can be expected to need and demand a share of medical manpower commensurate with its standing by various social, economic, and health indices.

3. In addition, there is also agreement as to the need to increase the productivity of existing health manpower, if the total health care needs of the citizenry are to be adequately served. To some extent these needs will be eased over time by changes that will be effected in the health care delivery system, including the expansion and extension of health care services provided by auxiliary health workers. Thus, the problem of health manpower supply, including the physician shortages requires a two-pronged approach: (a) the need to increase the supply through the expansion of medical education facilities, and (b) the need to expand productivity through the improved utilization of existing manpower.

4. The expansion of medical education can occur by expanding the enrollment of existing schools and by establishing new programs of medical education. These are not mutually exclusive choices, and the present situation in Michigan calls for both of these actions.

5. Expansion of medical education must not be made at the expense

of quality of existing or new programs. Proposals for a new program or for expansion of an existing medical school program must be weighed in the light of the state's needs for physician manpower, educational opportunities, and the capability of the institution in question to develop a program of excellence or to enlarge its existing capacity without deteriorating the quality of its educational program.

6. It would appear that a range of 588 to 630 first-year places in Michigan medical schools by 1975 represents a valid educational goal for the state at this time. A level of admissions related to this range would also assure the state of significant gains in its relative standing as a producer of physician manpower.

Recommendations

The major recommendations of the Citizens Committee on Education for Health Care with respect to the expansion of medical education facilities in Michigan are as follows:

1. Immediate steps must be taken to provide adequate capital funding and operating funds to support the greatest possible expansion and improved support of the two existing degree-granting schools of medicine in the State of Michigan.

2. Michigan State University should be provided sufficient funds to expand to a full degree-granting medical school and to expand its optimum size.

3. Simultaneously with the expansion and development of the medical schools of the University of Michigan, Wayne State University, and Michigan State University to optimum levels a fourth medical school should be developed; the fourth medical school should be designated a school of osteopathic medicine and the Michigan College of Osteopathic Medicine should be recognized as the first stage in such development.

4. Meaningful university affiliation is a necessary precondition to the establishment of any additional medical schools with use of public funding. Appropriate guidelines which should govern such affiliation are as follows:

   a. The university shall have sufficient academic strength to support a medical program as evidenced by a mature graduate program through the Ph.D. level in most, if not all, of the physical, social, and biological sciences, supportive of the teaching and research activities essential to a medical school program.

b. The university base shall demonstrate the existence of, or the potential for developing, a broad range of related health science programs which would utilize and support a medical center.

c. The university board of control shall have governance over and final responsibility for the academic and administrative affairs of the medical school.

d. When a proposed medical school site is not on or adjacent to the main campus, the university shall transmit to the State Board of Education its rationale for the location, consistent with guidelines (a) and (b) above.

5. The State Board should continue its efforts directed toward the possibility of the existing medical schools offering M.D.-D.O. degree options by opening discussions with the three universities and with appropriate state and national organizations.

NURSING MANPOWER

Introduction

The supply of manpower providing nursing services is characterized by complexities arising from size, diversity of educational backgrounds, instability of the work force, and ambiguities of function. The U.S. Public Health Service estimates that, as of January 1, 1967, about half the nation's health manpower were employed in nursing: 640,000 as registered nurses, 300,000 as practical nurses, 700,000 as aides, orderlies and attendants, and 10,000 as home health aides.

For Michigan in 1968 the data show an estimated work force of 25,000 registered nurses and 13,000 licensed practical nurses. Reliable estimates of aides, orderlies and attendants are not available, but, based on national figures, it may be assumed that some 28,000 to 30,000 persons were employed in these categories.

Registered nurses constitute the single largest group of health professionals, and there is ample evidence that the supply of R.N.'s is seriously inadequate, both nationally and in Michigan. The 1966 survey of hospital personnel conducted jointly by the American Hospital Association and the U.S. Public Health Service, shows that 47 states list R.N.'s as their most urgent manpower need. In Michigan approximately 60 percent of all active R.N.'s are employed in hospitals; the 1966 Survey lists R.N.'s, L.P.N.'s and aides, in that order, as the most urgent personnel needs in Michigan hospitals. The need for more than 3,000 additional R.N.'s comprises approximately 42 percent of the total personnel needs of A.H.A. registered hospitals in Michigan as reported in the survey.

Michigan ranks considerably below the nation and the East North Central region in ratio of active nurses to population; 277 active R.N.'s per 100,000 population in 1966, as compared with the national average of 313 per 100,000, and the regional average of 306 per 100,000 for the East North Central States. While practitioner population ratios are admittedly only approximate indicators of manpower supply, their shortcomings are mitigated somewhat when comparisons drawn between states sharing similar social, economic, and demographic features reveal significant variations. Thus, the sizable differences between the Michigan nurse population ratio and that of the East North Central States seemingly cannot be ignored.

In recent years Michigan has improved its output of registered

nurses, but continues to lag behind neighboring states and the national average in nursing graduates. In 1967, the ratio of R.N. graduates to population in Michigan was 17 per 100,000 while the average for the U.S. was 19 per 100,000. Again, comparison with states of similar social, economic and demographic characteristics shows Michigan further behind Ohio, 24:100,000; Illinois and Wisconsin, 21:100,000.

Because of the factors of size, complexity, and need which are involved in nursing manpower, consideration of nursing education issues was assigned to a special group, the Advisory Committee on Nursing Education. Moreover, because a rather extensive study of nursing manpower in Michigan had just been completed through a joint project of the Michigan League for Nursing and the Michigan Nurses Association1/, the Advisory Committee concentrated its attention on issues related to state planning for nursing education, and the extent to which such planning can influence the production and utilization of nurses. The Advisory Committee met regularly over a period of two years and from this effort compiled a full report on nursing education in the state of Michigan.2/

Early in its deliberations, the Advisory Committee recognized that the statutory role of the Michigan Board of Nursing with respect to approval of schools of nursing and the constitutional role of the State Board of Education with respect to coordination of higher education led each agency to make separate evaluations of proposed new programs in nursing education. There was an obvious need for additional procedures which would preserve the legal rights of both agencies while facilitating the process of program evaluation. A recommendation by the Advisory Committee prompted cooperative efforts by the State Board of Education and the Michigan Board of Nursing which resulted in approved guidelines for joint program review.

The new program review procedures have been successfully implemented; both agencies make decisions about nursing education on a continuing basis within an improved procedural framework. Thus far, however, these decisions have been made, of necessity, in the absence of a comprehensive assessment of future needs or a basic conceptual framework for statewide planning of nursing education facilities. Therefore, the Advisory Committee recommended specific steps to be taken towards the development of a state plan for nursing education.

1/ *Nursing Needs and Resources in Michigan, Today and Tomorrow*, a Report to the people of Michigan from the Michigan League for Nursing and the Michigan Nurses Association, 1966.

2/ *Nursing Education Needs in Michigan*, Report of the Advisory Committee on Nursing Education, Lansing: Michigan Department of Education, 1970.

Major Recommendations

(1) State Plan for Nursing Education

It was recommended that a state plan for nursing education be developed under the aegis of an official state body. The Advisory Committee further recommended that the planning function receive sufficient financial support to develop supportive data, to assess needs, to devise realistic goals, and to make specific recommendations for implementation of the plan.

(2) Effective Utilization of Nursing Manpower

With due concern for the quantitative shortage of qualified nurses, the Advisory Committee noted that factors of utilization seriously limit the availability and effectiveness of nursing manpower. New approaches to the organization of patient care services and utilization of unit managers or similar personnel to relieve nurses of non-nursing tasks are two examples of the specific measures suggested by the Committee for improving the effectiveness of the current supply of nurses. The obligation for improved utilization must be assumed through joint and cooperative efforts of health, hospital and nursing service administrators, schools of nursing, medical schools, and schools of hospital administration.

(3) Expansion of Nursing Education Facilities

The need for expansion of nursing education programs was clear from the outset; however, the Advisory Committee urged that first priority be given to nursing schools preparing registered nurse candidates. Shortage of nursing faculty is a limiting factor in expansion of educational facilities. Thus, the recommended expansion should be accomplished in two phases: Phase I would be related to the expansion of existing schools of nursing and to efforts toward increasing the supply of qualified faculty; Phase II would be concerned with the development of new schools.

(4) Progression From One Level of Nursing to Another

The Advisory Committee recommended that a systematic approach be devised to facilitate progression from one level of nursing preparation to another. This will require experimentation by educational institutions in designing curriculum, the support and encouragement of the State Boards of Nursing and of Education in fostering such experimentation, and the development and utilization of appropriate evaluation procedures.

(5) Educational Preparation of Licensed Practical Nurses

The Advisory Committee agreed that primary responsibility for the development and administration of education programs in the health care area should be carried by educational institutions. Therefore, it was recommended that the training programs for L.P.N.'s should be placed within the appropriate educational system in the community rather than in hospitals. The particular setting - whether vocational school, area school, adult education program, or other - can best be determined at the community level.

(6) Educational Preparation of the Nurse Aide

Pre-service education for the nurse aide should be provided by an appropriate educational institution such as adult education programs in vocational high schools or other settings. Such preparation should be given on the basis of an adequate, basic pre-service curriculum, to be followed by a brief, on-the-job training and orientation by the employing institution. Content of pre-service training should be kept specific to the scope of the job. The Advisory Committee further recommended that particular attention be given to incorporating job satisfaction into entry level positions.

(7) Recruitment

The Advisory Committee noted that the present demand of educational institutions for nursing students coupled with the foreseeable expansion of nursing education facilities would require vigorous efforts to improve recruitment of students into nursing. Recommendations were in three major areas: public information, counseling, and recruitment of disadvantaged persons. It was emphasized by the Committee that informational and educational efforts directed to students and student counselors should result in improved student selection of the type of program most appropriate to abilities and career goals.

OCCUPATIONAL THERAPY SERVICES

Introduction

Occupational therapy employs educational, recreational, creative, and manual activities, and industrial training to restore injured muscles and joints, retain skills, and effect the mental readjustment of mentally or physically handicapped patients.

Occupational therapy is not licensed as a profession by any state. However, entry to the practice of the profession is controlled by the accreditation of educational programs and the registration of therapists by the American Occupational Therapy Association (AOTA). The Council on Medical Education of the American Medical Association, in collaboration with the American Occupational Therapy Association, develops standards, inspects, and accredits professional curricula in the field. Graduates of accredited programs are eligible to take a national registration examination conducted by the AOTA, successful completion of which qualifies the therapist as a professional entitled to use the title, registered occupational therapist (OTR).

A certification program has been developed for the assistant or technical level of occupational therapy. Eligibility is achieved through the successful completion of a training program approved by the AOTA, and entitles the person to use the title, certified occupational therapy assistant (COTA).

Trends Affecting Educational Planning

The basic professional program in occupational therapy consists of a four-year undergraduate curriculum plus nine months of clinical experience. A number of universities offer a certificate program to holders of acceptable baccalaureate degrees, such programs consisting of one-year's academic study plus nine months' clinical experience. The tendency is to phase out the certificate programs in favor of emphasis on the integrated undergraduate curriculum and the master's program. The three professional programs in Michigan -- Wayne State, Eastern, and Western Universities -- all offer the bachelor's degree and all have or are developing a master's program. The Eastern program offers a master's in psychiatric occupational therapy and was initiated in 1968. In the

academic year 1967-68, the three institutions had a combined total enrollment of 454 students at all levels.

The majority of occupational therapy assistants now employed have been trained in short courses (three to six months in length) sponsored by employing hospitals and agencies or have been certified under a grandfather clause on the basis of experience and in-service training. One training program under the auspices of MDTA was conduct in Michigan. The AOTA is now supporting the development of formal curricula in occupational therapy assisting at the one-year certificate level, or the two-year associate degree level, leading to eligibility for certification as a COTA. The first educational program in Michigan was initiated by Schoolcraft Community College in the fall of 1968. The program, a one-year certificate course, will graduate its first class in the summer of 1969. Schoolcraft has applied to the AOTA for accreditation of its program.

The demand for both professional occupational therapists and trained assistants is quite strong. The 1966 AHA-PHS Hospital Survey indicated the need for 145 additional OTR's in order to fill budgeted vacancies and provide optimal levels of care. Salaries in occupational therapy both for the professional and technician level have improved markedly in recent years. The Michigan Department of Mental Health, one of the largest employers of therapists, provides a starting salary of $7600 for inexperienced OT graduates. Salary levels for supervisory positions rise to $10,000 to $13,000 per year. For a certified occupational therapy assistant, the Department provides a beginning salary of $5993 and a maximum of $6953. These salary levels compare favorably with other health occupations for which training is at the associate degree level.

Available data indicate the supply of professional therapists and trained assistants in Michigan is inadequate at the present time. The small number of graduate level students further restricts the output of professionals and technicians as most teaching positions require graduate training. (Western Michigan is currently increasing emphasis on its graduate program and Wayne State is developing a new master's program).

Recruiting for the field competes with the other health professions and currently seems more effective in attracting women rather than men into the field. As a result, the profession experiences a high attrition rate, and, according to one study, a low median amount of experience. Western Michigan reports that its male graduates are particularly interested in the industrial skills and in attaining supervisory positions.

Recommendations

A. Education

1. Present professional training programs should be expanded, but this expansion must be coupled with more active educational recruitment. Recruitment might be more productive if performed in conjunction with the other health professions and if more men could be attracted to the field.

2. Community colleges interested in instituting occupational therapy assistant training programs should be encouraged to seek technical assistance from one of the universities offering professional training. The community college should also have access to adequate clinical resources for the clinical experience required.

B. Utilization

The development of manpower pools of part-time therapists and continuing education programs might induce inactive professionals to return to the labor force. The Michigan Occupational Therapy Association's efforts to provide refresher training should receive the cooperation and support of the agencies and institutions which are chief users of occupational therapy services.

C. Needed Data and Research

More comprehensive data on professional occupational therapy students in the state, including information about numbers of applicants, geographic origin, attrition within the educational program, would provide a better basis for predicting manpower needs and perhaps shed light on the recruitment problems of the profession.

ORTHOPEDIC AND PROSTHETIC APPLIANCE MAKING

Introduction

Orthopedic and prosthetic appliance makers fabricate and fit artificial limbs, braces, and appliances for body deformities and disorders in accordance with a physician's prescription. These technicians may also instruct the patient in the use of the device. Those specializing in making and fitting artificial limbs are designated as prosthetist; those making and fitting orthopedic devices are designated as orthotists. Some persons are certified in both prosthetics and orthotics.

Orthotists and prosthetists are not subject to licensure in any state, but there is a voluntary certification program under the direction of the American Board for Certification in Orthotics and Prosthetics. In 1967, there were 48 certified orthotists and prosthetists in Michigan, who represented an estimated 25 percent of the state's manpower in this specialty area.

Trends Affecting Educational Planning

The majority of orthotists and prosthetists have been trained on the job; the usual route to certification is through an apprenticeship of not less than four years.

Three institutions of higher education have undertaken educational programs in prosthetics and orthotics: New York University has a four-year curriculum leading to the degree of Bachelor of Science in prosthetics and orthotics; Chicago City College and Cerritos College in Norwalk, California have a two-year, Associate in Arts degree program. In addition, Delgado College, New Orleans, has recently established a one-year experimental training program for bench technicians.

There is some indication of current or impending manpower shortages in orthotics and prosthetics, chiefly in the Greater Detroit area. However, as an occupational area, orthopedic and prosthetic appliance making is relatively small and limited in growth potential. The development of formal educational programs in this field is of quite recent origin. While it is likely that the trend toward academically based education will continue in this, as in other health fields, it is also probable that

apprenticeship and on-the-job training will continue to supply the bulk of the manpower in the field for some time to come. Shortage of faculty skilled in this field will be an obstacle to development of formal educational programs.

It is also likely that technological change will affect the training requirements in orthotics and prosthetics. The application of electronics to this field is resulting in such new and sophisticated devices as the electronically controlled artificial hand.

Recommendations

1. The need for a two-year community college program in orthotics and prosthetics in Michigan is not yet clearly established as having a high order of priority. The need for such a program should continue to be evaluated, based upon data relating to manpower supply and demand factors.

2. Existing shortages in one aspect of the field might be met by a pilot program to train "bench technicians" in a hospital orthotic and prosthetic facility - either at University Hospital, Ann Arbor, or Henry Ford Hospital, Detroit. Funds might be available from the U.S. Rehabilitation Services Administration for such a program. If such a program were initiated, special efforts should be made to recruit from disadvantaged groups, including high school dropouts.

PHARMACY

Introduction

Pharmacists practice in three major settings: community pharmacy, institutional pharmacy, and industrial pharmacy. All states and the District of Columbia require that practicing pharmacists must be licensed. Educational requirements for licensure include graduation from an accredited school or college of pharmacy consisting of five years of post secondary education -- two years of which may be pre-pharmacy followed by three years of study in a college of pharmacy. One year of internship is also required under Michigan licensure law, six months of which may be earned while the student is in school. It is mandatory that six months of internship be earned after the baccalaureate.

There are three schools of pharmacy in Michigan: at Ferris State College, the University of Michigan, and Wayne State University. All three offer the B.S. degree in pharmacy; the University of Michigan and Wayne State University also have extensive graduate programs leading to the Master's and Ph.D. degrees. The University of Michigan College of Pharmacy also offers an optional six-year professional program (2-4) leading to the Doctor of Pharmacy degree. This program is designed primarily for students who wish to specialize in hospital pharmacy, but has two other clearly defined options: (1) professional practice (other than hospital) and (2) industrial technology. This was the first optional pharmacy program in the United States and is one of a total of five now being offered (the University of California and the University of Southern California have required Doctor of Pharmacy programs and do not offer the Bachelor of Science degree).

Trends Affecting Educational Planning

The development of new drugs compounded by the drug manufacturer and packaged in a form taken by the patient has involved many community pharmacists increasingly in sales and managerial duties rather than the duties of a full-time professional. Some pharmacists feel they are overeducated for their non-professional role and under-utilized as health professionals. In Michigan, 86.5 percent of the active pharmacists practice in community pharmacies. Although there has been increasing emphasis in recent years on enlarging the scope of professional duties

within the community pharmacy setting, most community pharmacists tend to function with respect to the dispensing of drugs and medicine chiefly as highly trained technicians handling non-decision-making kinds of dispensing. Hospital pharmacists, on the other hand, are expected to fulfill a more professional role, having responsibility for control and distribution of drugs and drug information throughout the hospital, and working with physicians and other members of the health care team, possibly teaching in schools of nursing, as well as performing administrative duties. While there are manpower shortages in the community pharmacy setting, it is in the institutional setting of a hospital that the acute shortage of pharmacists exist. It is likely that the low salaries paid to hospital pharmacists as compared to potential earnings of the community or research pharmacists account in part for the failure of pharmacists to be attracted to hospital settings. In the past, educational emphasis in most schools of pharmacy has been centered around the community pharmacy because the majority of entering students have community practice as a career goal. However, this emphasis is changing; the University of Michigan's Doctor of Pharmacy program and Wayne State University's revised curriculum stressing education of pharmacists to be patient-oriented rather than product-oriented are examples of new trends in pharmacy education.

The question facing the pharmacy profession today is whether the role of pharmacists will be that of a trained technician or of a true health professional. The view of pharmacy educators is that the answer is the latter and that the solution lies in improved education and orientation of the pharmacist to assume a more active professional role. This role would involve working closely with physicians, dentists, nurses, and other health professionals as a member of the health care team. Obviously, to provide an interdisciplinary approach within a clinical setting it is essential that adequate health care facilities be readily available for use by the college of pharmacy. This necessitates availability to schools of pharmacy of suitable institutions (hospitals, etc.).

Pharmacy assistants or technicians are utilized in a number of large hospitals and in some community pharmacies. Generally, these persons receive some informal, on-the-job training or orientation, but no formal educational programs exist in Michigan. However, one pilot effort to develop a two-year community college program is underway in Minnesota.

Relationships with Other Health Professions

Existing physician shortages resulting in higher patient-to-doctor ratios, combined with incredible development of new drugs and drug applications, seem to indicate a need for pharmacists to assume a clinical role within the health care team, in community practice and within the hospital setting. As it is now, education of the patient in the use of drugs and medicine goes largely by default, since the typical busy physician lacks

the time either to inform himself of all of the available data concerning side effects, etc., of new drugs and medicines or to impart the information he does possess to his patients. In addition, patients today often have several physicians to whom they go, each prescribing medications for the patient's use. If the pharmacist is to assume a broader role as a health care consultant in the area of drugs and drug usage, basic education and professional training will need to be broadened and there would need to be changes in the educational structure as well as methods of teaching in schools of pharmacy. The pharmacy student would need to have a grasp of more of the course work offered to medical students; in addition, exposure to patients in various types of clinical settings including hospitals, outpatient clinics, extended care facilities, etc. would be necessary.

In the hospital setting, drug distribution methods are undergoing reevaluation and change, as evidenced by such developments as unit dosage and direct transmission of medication orders from physician to pharmacist. In addition to affecting the practice of hospital pharmacy and pharmacy manpower needs, these changes will have implications for the practice of nursing, for the organization and design of nursing stations, and for the physician's method of prescribing drugs. These trends also point to a need (which has been widely noted in current studies and evaluations of all types of health manpower) for the role of each member of the health care team to be clearly defined to prevent infringement, or abrogation, of responsibilities, and to assure that each team member serves as a complement to the other in rendering modern patient care.

Recommendations

A. Education

1. Colleges of pharmacy should make efforts to strengthen and increase their activities in clinical pharmacy.

2. Whenever possible, colleges of pharmacy should promote joint learning experiences in clinical settings between pharmacy students, and medical, nursing, and related health professional students. In addition, specific course work in interprofessional relations might be developed.

3. The respective roles of the professional pharmacist and of the pharmacy aide or technician need to be clearly defined. The issue of the appropriate training or education for the pharmacy assistant or technician should then be explored jointly by the pharmacy profession, the three schools of pharmacy in Michigan, and the hospitals currently utilizing such personnel to determine whether the present informal, on-the-job training is effective and efficient.

4. The three schools of pharmacy should make available to practicing pharmacists more opportunities for continuing education, not only to keep abreast of new developments in the pharmaceutical field, but also to reorient pharmacists to a more active role as community health educators and as consultants to the medical profession.

5. There is a definite need for a multidisciplinary type of continuing educational programs and meetings offered jointly by and for pharmacists, physicians, nurses and other health professionals so that each understands current problems and changes facing the other in patient care.

B. Utilization and Practice

1. Efforts should be made to meet the shortage of hospital pharmacists through improved utilization; hospital associations at the district and state levels should develop improved techniques for assessing staffing requirements in pharmacy departments by relating needs to such factors as type and extent of services provided. Inherent in such assessment is examination of the nonprofessional functions and the means by which delegations of such functions to other personnel may be improved.

2. The role of the community pharmacist as consultant to small hospitals and nursing home facilities should receive greater attention. Federal regulations under the Medicare and Medicaid programs require participating hospitals and extended care facilities to meet certain standards for the dispensing of drugs and pharmaceuticals, yet a number of small community hospitals in the state and many extended care facilities lack a pharmacy department or adequate pharmacy consultant services. Such institutions will need to develop cooperative relationships with other hospital pharmacies or with community pharmacists in order to provide the pharmaceutical services required under the federal programs.

3. The community pharmacist shall recognize and exercise his responsibility for offering consultation services to physicians and the public in regard to prevention of side effects, adverse drug reactions and the proper use of over-the-counter medications. To achieve this end medication profiles should be established and proper drug references available to screen all prescription orders.

PHYSICAL THERAPY

Introduction

Physical therapy is concerned with the restoration of function and the prevention of disability that may arise from disease, injury, or loss of a bodily part. The physical therapist employs various modalities including heat, water, light, and electricity in addition to therapeutic exercises and massage in treating the patient. A wide variety of injuries and diseases readily lend themselves to physical therapy, including multiple sclerosis, some nerve injuries, certain chest conditions, amputations, fractures, arthritis, and cerebral palsy. Physical therapy as a profession developed rapidly after World War II, and physical therapists are now widely employed in hospitals and rehabilitation centers. The majority of physical therapists are educated under one of two general curriculum sequences: a four-year bachelor's degree course or a twelve to sixteen month certificate course for students who hold a bachelor's degree in other than physical therapy. In addition, five universities in the United States have two-year graduate programs leading to a master's degree for students with a bachelor's degree in the requisite subject areas. In all curriculums, a minimum of four months of clinical education is required during which physical therapy students participate in care of patients under the supervision of qualified physical therapists.

There are two programs in Michigan: the University of Michigan and Wayne State University (which instituted its program in the fall of 1965) offer the four-year, undergraduate curriculum.

Physical therapists are licensed in Michigan and all other states except Missouri and Texas.

Trends Affecting Educational Planning

Increased emphasis on the health needs, generated by chronic disease and disability, especially among the aging population, points to a growth in the demand for physical therapy services. Coverage of home health services under Medicare should increase the effective economic demand for these services, since, apart from skilled nursing care, physical therapy is the service most often provided by home health agencies.

Nationally, about 80 percent of all physical therapists are women; among licensed therapists in Michigan women constitute 72 percent. The preponderance of women in the field has contributed to a fairly high attrition rate in the supply of active manpower. Recruiting for physical therapy training programs competes with the other allied health professions and is hampered by the science prerequisites necessary for the professional programs.

Available data indicate an inadequate supply of professional therapists and trained assistants in Michigan. The 1966 AHA-PHS Survey identified the need for 116 additional physical therapists and 57 additional physical therapy assistants in Michigan hospitals in order to provide an optimum level of care. The estimated shortage of physical therapists amounts to some 40 percent of the total number employed in 1966 -- 285. Moreover, physical therapists were reported as one of the five most urgently needed personnel categories by Michigan reporting hospitals. This survey does not begin to touch on the personnel needs in other settings: extended-care facilities, home health agencies, rehabilitation centers, etc. According to the Michigan Department of Public Health as of October, 1968, there were 20 registered P.T.'s employed in county medical care facilities, 36 serving home health agencies, and 21 in private practice. The trend is to greater utilization of therapists in these and related settings as time goes on.

A comparison of the number of registered physical therapists (A.P.T.A.) in 1958 with the number of licensed P.T.'s in 1968 shows an actual decrease in supply -- from 439 to 433. Although the University of Michigan has increased the size of its program, and Wayne State University hopes to do so in the near future, the total output of bachelor's degrees in physical therapy awarded in Michigan in 1968 was only 32. Clearly, there is a demonstrated need, on the basis of reported shortages in short-term general and special hospitals alone, of a greater output in Michigan.

The use of subprofessionals is, of course, a common response to a shortage of personnel at the professional level. The physical therapy profession has been somewhat slow to move in the direction of establishing formal guidelines and curriculum for the training of such persons. In the meantime, a variety of ad hoc training programs and on-the-job training for subprofessional assistants or aides have been utilized by institutions and agencies employing physical therapy services. The American Physical Therapy Association has recently adopted policy statements concerning two levels of subprofessional personnel in the field of physical therapy:

1. The physical therapy aide, who would be a non-licnesed worker trained in an essentially on-the-job training program, would perform routine tasks including assisting in the patient-related activities which are predetermined by the professional therapist. The APTA has developed curriculum guidelines which call for a highly structured 8-week curriculum with supervised on-the-job training provided in an established physical therapy service, and the

classroom instruction in an approved hospital, home health agency, rehabilitation center or public vocational school.

2. A physical therapy assistant would be educated in a two-year associate degree curriculum, presumably in a community college, and would assist the professional therapist in procedures "commensurate with his training and education." The APTA advocated mandatory licensure of the assistant position.

According to a survey conducted by the Michigan Chapter of the A.P.T.A. 118 of the nearly 200 physical therapists who replied indicated they could use one or more assistants. Some confusion seems to exist as to the role and functions of subprofessionals in physical therapy and as to the appropriate content and structuring of training programs for such personnel. It has been suggested that the aide level position would be involved almost exclusively in nontreatment aspects of therapy services and thus would need no more than relatively brief on-the-job training. The certified physical therapy assistant, on the other hand, would be trained to treat patients under the supervision of a registered physical therapist and would also be subject to state licensure. Appropriate training for this level would be a two-year, associate degree program in a community college setting.

Recommendations

A. Education

1. Efforts should be undertaken to develop a third professional program in the state. Considerations involved in locating such a program include the desirability of access to a medical school or medical center which would provide opportunities for a diversity of clinical experience and the academic resources of the college or university, especially availability of programs in such related fields as occupational therapy.

2. The State Board of Education, in cooperation with the Michigan chapter of the American Physical Therapy Association, should explore the means whereby a pilot, two-year program for physical therapy assistants could be developed in one of the community colleges. The logical locale for such an experimental program would be in a community college having proximity to clinical facilities and to one of the two professional programs, which could be expected to provide technical assistance in the development of a new curriculum.

B. Utilization and Practice

1. There is a need for a more careful delineation of the scope

of duties and responsibilities in the practice of physical therapy which would be delegated to the subprofessional physical therapy assistant. This would be particularly essential in terms of drafting legislation for licensure of such personnel. The state chapter of the APTA in collaboration with the employing agencies and with the two professional programs should work on this problem.

2. Efforts to develop a formal structured training program for a subprofessional worker at a level below that of the physical therapy assistant - the physical therapy aide - should be postponed or abandoned. Given the present limited supply of qualified physical therapists to conduct the needed training programs and to supervise such workers and the lack of information about the potential usefulness and employment opportunities in the field for this level of worker, it would appear preferable to concentrate available professional and educational resources in Michigan on developing educational programs and appropriate patterns of utilization for the physical therapy assistant.

PODIATRY*

Introduction

Podiatry is a limited medical subspecialty concerned with diagnosis and treatment of minor conditions of the human foot. Podiatrists are licensed to practice in all states and the District of Columbia; the limits of practice -- for example, the type and extent of surgery the podiatrist may perform, use of anesthetics and drugs -- are set by the respective state laws. The Michigan licensure law is fairly typical, permitting the podiatrists to perform minor surgery, prescribe drugs, physical therapy, and shoes, and fit corrective devices. The total supply of podiatrists in the United States is quite small, about 8,000 -- a figure that has remained relatively unchanged for the last several years. In Michigan the number of podiatrists has ranged between 260 and 270 for the last decade. Educational preparation of the podiatrist takes place in five independent colleges of podiatry in the United States. These schools offer a four-year curriculum with a prerequisite for entry of two years of undergraduate study in an approved college or university.

Relationship to Other Health Occupations

Podiatrists have traditionally functioned as an autonomous profession in private practice, their incomes derived on a fee-for-service basis. Until the mid-1950's, podiatrists had staff privileges in many general hospitals, enabling them to admit their own patients directly into the hospital. As a result of a 1955 action by the Joint Commission on Accreditation of Hospitals, podiatrists were removed from hospital staffs as independent practitioners and excluded from new staff appointments in such capacity. Spokesmen for the podiatry profession have objected to

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*The terms podiatry and podiatrist have superseded "chiropody" and "chiropodist", the former terminology for this profession. The Michigan licensure law was amended by Public Act 345 (1965) to reflect this change.

the limitations imposed by the Joint Commission on the practice of podiatry within the hospital setting, although this regulation of in-hospital practice of podiatry is analogous to that of physical therapy or clinical psychology. Desire to maintain autonomony has led to some tendency on the part of podiatrists to establish separate hospitals or foot clinics. This has tended to further isolate podiatry from the medical community.

Trends Affecting Educational Planning

Within the podiatry profession there has been considerable effort to increase the podiatrist's qualifications and training. For example, in Michigan the licensure law was amended effective 1960, to require one year of internship in a clinic or hospital approved by the State Board of Registration in Podiatry as a prerequisite to licensure; effective 1967, the podiatry educational requirements were increased to two years of undergraduate college preparation.

Schools of podiatry have traditionally operated as independent schools outside of the mainstream of other professional education, which has tended to be more and more integrated with the academic community of the university. The separation of podiatric education from other professional education has perhaps accentuated the relative isolation of the profession from other health workers. The educational setting of podiatric programs may also account in part for the declining enrollments in schools of podiatry during the 1950's. Testimony presented before the U.S. Congress in 1963, relating to the Health Professions Assistance Act, indicated that the schools of podiatry in 1961 enrolled only about two-thirds of the students who could have been accomodated if additional qualified applicants had been available.

There is much on the current scene suggesting that there could be a greater role for podiatry in the total area of health services, now increasingly demanded by a growing population. There is a greater emphasis placed on preventive and rehabilitative health services, especially among the expanding population of older people who are particularly prone to foot problems; there is lack of interest or emphasis on the details of foot care among many doctors of medicine; and the trends toward preventive foot care for children are leading to specific programs in schools and government clinics in which podiatrists might well participate.

Recommendations

Efforts should be made to devise means for integrating the podiatrist into the system of delivery of health care services. Such efforts might include:

1. Discussions between the podiatry profession on the one hand and the hospital and medical associations on the other, aimed at facilitating greater provision of podiatry services in general hospitals and allied institutions. Effective health care is not well served by the development of such subspecialty facilities as podiatry hospitals and clinics.

2. Active efforts to incorporate podiatry services into nursing homes and other settings in which health services are provided to the aged.

3. Consideration by the podiatry profession of means for integrating its educational programs into the mainstream of higher education. Since there are no schools of podiatry in Michigan, nor any indicated need for the establishment of such an educational program, the efforts within the state might well be concentrated on joint continuing education programs with the medical community which would clarify the supportive role of podiatrists in the area of foot care and help counter the tendency to fragmentation of health services in this area.

PSYCHOLOGISTS IN THE HEALTH SERVICES

Introduction

Psychology is defined broadly as the science of human behavior, concerned with how people act and why they act the way they do. Roughly one-third of all psychologists are engaged in health activities. The three specialiaties most directly involved in the health care field are: clinical psychology, counseling, and social psychology. Psychometry is a closely related field, requiring only a bachelor's degree, which serves in a supportive role in the field of psychology. The clinical psychologist usually works in a mental hospital, clinic, or other medical setting. He may assist in the diagnosis and treatment of individuals with mental and emotional problems and illnesses.

The counseling psychologist is concerned primarily with preventing mental illness rather than treating those who are already seriously maladjusted. These specialists work in many settings including schools, industry, and community agencies. Social psychologists are concerned with group rather than individual behavior and with research rather than with direct care - only a small number are involved in health settings. The psychometrist specializes in administering and scoring psychological tests and sometimes aids in the formulation of the test itself.

Licensure and Registration

In the state of Michigan, the Psychologist Registration Act of 1959, amended in 1961 and 1965, vests the Superintendent of Public Instruction with the power of licensure. The Superintendent evaluates applicants for certification at three levels of psychological competence, directs examinations at his discretion or when required to do so, and designates the committee which will conduct the examination.

From highest to lowest the three levels of certification are consulting psychologist, psychologist, and psychological examiner or technician. Each level requires the status or impending status of United States citizen and a minimum age of 21. Additionally, a prospective consulting psychologist must possess a recognized doctoral degree. And, finally, each of these applicants must pass an examination in his specialty and in additional fields of psychology, the latter to be determined

at the discretion of the Superintendent.

The requirements for certification as a psychologist differ from those of consulting psychologist in that experience need only include one year of supervised professional work, and any and all examinations are at the discretion of the Superintendent.

The third and lowest level of certification is that of psychological examiner or technician. Applicants for this status are required to possess a recognized master's degree in psychology and at least one year of supervised professional experience acceptable to the Superintendent.

Three other provisions of the Psychologist Act should be noted. First, it contains a "grandfather clause", the provisions of which expired on March 19, 1962. During the preceding two year period, the Superintendent was empowered to certify persons at all three levels who, in lieu of the educational requirement, offered a total of five years appropriate experience out of the ten year period directly preceding the 1959 legislation. Second, the Act provides for conditional reciprocity with other states regarding certification and recognizes the diploma granted by the American Board of Examiners in Professional Psychology. Third, the Act prohibits any individual or private clinic from rendering psychological services for consideration unless such services are rendered or supervised by a certified consulting psychologist. However, the Act provides no regulation for the rendering of these services within such entities as hospitals, schools, public corporations, governmental and non-profit organizations. Thus, psychologists functioning in most health settings need not be registered under state law, would not have to meet prescribed standards and, their duties might or might not correspond to their educational qualifications.

Trends Affecting Educational Planning

The field of psychology includes a wide and increasingly greater number of specialties with some only marginally concerned with health care. The specialist most in demand by health agencies is the clinical psychologist. Education of the clinical psychologist is rigorous and costly. The American Psychological Association has established standards for training and practice which strongly emphasize training to the Ph.D. level; however, it has been estimated that in actual practice up to two-thirds of those employed in Michigan state agencies are trained at the master's level. Doctoral programs in clinical psychology are offered at the University of Michigan, Michigan State University, and Wayne State University.

Issues and needs in the field of psychology have been identified by studies both at the state and national levels. The Task Force on Manpower for Mental Health Planning in Michigan, whose report was submitted in May, 1965, made the following remarks in regard to utilization patterns:

> Literature indicates that more emphasis has to be placed on the better assignment of personnel such as clinical psychologists. There are many positions that could be filled by Master's graduates rather than by the Ph.D.'s In order to get maximum utilization of the graduates, we should clearly define the positions and fill the positions only with the type of individual that is actually needed...
>
> There are also many assignments which are nonclinical in nature that are filled by clinical psychologists. With a shortage of clinical psychologists, it would seem that a more selective hiring should take place in order to enable the clinical psychologist to perform in his chosen field.

In regard to training, the Task Force made the following observations:

> ...very few of the clinical psychologists trained in Michigan remain here in teaching, research and clinical activity. It is believed that career opportunities are greater for psychologists in other parts of the country as compared with Michigan. It seems necessary to evaluate this situation more carefully as to their need in Michigan and problems that may exist in opportunities as they exist here.

Interprofessional Relations

Both psychiatrists and clinical psychologists provide preventive and therapeutic services to the public. This overlapping has been a source of some controversy with respect to coverage of psychological services under health insurance generally and, in particular, under Part B of the Medicare program. The concern of the American Psychological Association, as submitted in the *Statement by the American Psychological Association* to the Public Health Service, August, 1968[1/], is presented succinctly in the following statement: "Present Medicare regulations, requiring interposition of medical referral and direction for outpatient mental health services, provides no guarantee that this procedure will result in increased health or safety for the patient. Such interposition, required by statute, denies to psychologists the exercise of their own professional responsibilities in patient disposition and management."

1/ *Statement by the American Psychological Association* submitted to the Public Health Service, August, 1968. Appendix B, Independent Practitioners Under Medicare, A Report to Congress, Department of Health, Education, and Welfare, Wilbur J. Cohen, Secretary.

Conclusions

The issues identified by professional psychologists at the state and national levels clearly indicate the problems that need to be resolved before firm recommendations for change can be considered in the present educational framework. The Michigan Task Force report pointed to the need to improve utilization patterns and to provide better retention incentives for trained personnel; the quality and availability of educational offerings were not questioned in the report. As yet little has been done to implement these recommendations which appear to be sound and which should be given consideration.

With respect to questions of utilization of the clinical psychologist and his role in providing psychological services, the American Psychological Association made the following statement: "The Association is keenly aware that the health enterprise in the United States is in a fluid state. Long-held assumptions within established health professions regarding role definitions and educational requirements are coming into question. Organized psychology is not immune from this influence. This period of softening of assumptions can be a challenge rather than a threat if seen as a product of advances in the health field rather than of inaction."

RADIOLOGIC TECHNOLOGY (X-RAY TECHNOLOGY)

Introduction

Radiologic technologists (also called x-ray technologists or technicians) operate x-ray equipment under the general direction of a physician who is usually a radiologist. There are three programs of training at the technical level in the radiological sciences: x-ray technology, radiation therapy technology, and nuclear medicine technology. The x-ray technologist is primarily concerned with demonstration of portions of the human body on an x-ray film or fluoroscopic screen for diagnostic use of the radiologist. The nuclear medicine technologist uses radioactive isotopes to assist the radiologist in the diagnosis and/or treatment of illness or injury. The radiation therapy technologist uses radiation producing devices to administer therapeutic treatments as prescribed by the radiologist.

Certification in radiologic technology dates back to 1922 with the establishment of the American Registry of Radiological Technicians. The Registry came under the sponsorship of the American College of Radiology and the American Society of Radiologic Technologists in 1944, and in that same year, the Council of Education of the American Medical Association instituted a program of accreditation for schools of x-ray technology. In 1962, the Registry enacted programs of examination and certification in nuclear medicine technology and radiation therapy technology.

Qualifications for registration in x-ray technology include successful completion of a program of formal training in x-ray technology of not less than 24 months which has been approved by the Council on Education of the AMA. Until July 1, 1966, the Registry also accepted applicants who had completed at least 24 months experience, including training in full-time x-ray work under the direct supervision of a diplomate of the American Board of Radiology or a recognized medical radiologist of equal qualifications. All candidates must also pass a written examination administered by the Registry. Nuclear medicine technology and radiation therapy technology are usually based on the minimum requirements for x-ray technology, although persons who are professionally certified in nursing, medical technology, or hold a bachelor of science degree in the fields of biology, chemistry or physics are eligible to enter these specialty training programs. All applicants in both specialties must pass a written examination in the subject area.

Trends Affecting Education

A considerable number of persons who are working in the field of x-ray technology do not meet the minimum standards of education, training, and experience set by their professional associations. Some data on the prevalence of non-registered x-ray personnel in Michigan hospitals were obtained in the American Hospital Association's 1966 survey of hospital personnel. In 1966, about 900 x-ray technologists and 300 x-ray assistants were employed in AHA-registered hospitals in Michigan. On a full-time equivalent basis, 20 percent of the total designated as x-ray technologists were not registered. Of all x-ray personnel, including the x-ray assistant 37.5 percent were not registered. It is estimated that about one-fourth of the x-ray technologists work in hospitals -- the remaining three-fourths are employed in independent laboratories, in physicians' and dentists' offices, by government or voluntary health agencies, and by school systems. Data on proportions of registered and non-registered personnel among the non-hospital employees are not available.

The increasing use of radiological methods in the diagnosis and treatment of diseases has already made evident the severe manpower shortages in the field. It appears future manpower needs will increase proportionately with the expansion of the radiological sciences.

In addition to the radiologic technologists needed for new jobs, replacement demands will probably be high because of the large number of women who leave their jobs each year for marriage or family responsibilities. Women constitute an estimated three-fourths of the technologists in radiology. Men are generally paid higher average salaries than women; however, the men who leave the field note unattractive salaries as the primary reason.

The trend in new training programs in radiologic technology is away from the traditional hospital-based program towards programs established in community colleges and four-year colleges with clinical experience provided in affiliated hospitals. Nevertheless, the vast majority of x-ray technologists continue to be trained in hospital-based programs. Of the 41 approved programs in Michigan, only 5 are based in educational institutions (4 in community colleges, one in a four-year institution). Most of the hospital-based programs have small enrollments; in 1965-66, there were 22 hospital programs that produced fewer than five graduates; of the remaining 14 programs, only two produced more than 10 graduates.

One problem in attempting to adapt the x-ray technology curriculum to community college programs is that a minimum program length of twenty-four months is now required by the Council on Medical Education of the A.M.A. In 1965 the New York State Department of Education evaluated x-ray technology curricula for adaptation to community college planning. The curriculum study committee determined that about 63 percent of the entire x-ray technology curriculum could be centered in the community college with the remaining 37 percent requiring the use of clinical

facilities. On this basis, it was suggested that a community college program, by reducing the number of hours of clinical experience and making use of the summer period as a practical period, could enable students to fulfill their requirements within the scope of a two-year program.

Because of the growing complexity of radiologic equipment and of techniques, some experts in the field favor developing a limited number of baccalaureate level programs which would reflect more intensive training and additional preparation in anatomy, physiology, advanced physics, and electronics.

Recommendations

1. Efforts to restructure the basic x-ray technology program curriculum for adaptation to community colleges by such agencies as the New York State Board of Education and the American Association of Junior Colleges have not yet been successful. Therefore, before Michigan community colleges are encouraged to initiate such programs, the State Board of Education should work directly with the American College of Radiology in support of redesign of curriculum to be reflected in registry requirements. In particular, reduction of the required clinical experience from the present 2400 hours to an appropriate number of hours to master the job entry skills should be sought.

2. Assessment should be made of existing clinical facilities for the training of x-ray personnel in order to determine whether expansion of existing training programs, consolidation of several smaller programs into a cooperative or consortium effort, or phasing out of some programs in favor of educational institutions which could offer the programs to larger classes would result in the most effective use of limited clinical facilities and scarce professional staff.

3. Following a recommendation by the National Advisory Committee on Radiation in a report to the Surgeon General, U.S. Public Health Service, April, 1966, and in view of the number of non-registered personnel now in x-ray technology, the State Board of Education should support licensure of those persons who operate x-ray equipment or those who use radioactive materials not regulated by the Atomic Energy Commission.

SOCIAL WORK

Introduction

Social work has been defined as "the system of organized activities carried on by persons with particular knowledge, competence, and values, designed to help individuals, groups, or communities toward mutual adjustment between themselves and their social environment." There are three basic methods of social work practice -- case work, group work, and community organization. The vast majority of social workers employed in the health area use the case work approach, although group work has been employed with institutional populations.

The National Association of Social Workers (N.A.S.W.) estimates that about 27 percent of its total membership is engaged in health and medical care programs. Health settings in which social workers are employed include hospitals, clinics, health agencies, rehabilitation centers, mental hospitals, and extended-care facilities.

In general, only those persons with a master's degree in social work (usually the M.S.W.) are considered "professional" social workers. Professionalization of the social work field, i.e., recognition of the M.S.W. as the professional credential, has been a long-range goal of the N.A.S.W. There are, however, large numbers of persons lacking such graduate training employed in various social work capacities. The 1966 A.H.A.-P.H.S. survey showed that almost 30 percent of the social workers employed by reporting Michigan hospitals held only a baccalaureate degree. There is no exclusive right to the title "social worker", although N.A.S.W. has instituted a certification procedure for social workers with a graduate degree and two years of approved experience.

Trends Affecting Educational Planning

The pressure for professional status for and by social workers has increased the already great demand for persons holding a master's degree in social work (M.S.W.). Graduate schools of social work do not begin to meet this burgeoning demand. Persons with a variety of training fill social work positions, and the trend towards professionalization leaves their role ill-defined. The background of non-M.S.W.'s in health related settings often includes undergraduate social work study, psychology, sociology, or nursing.

Three of the 64 accredited graduate schools of social work in the United States are located in Michigan: at the University of Michigan, Wayne State University, and Michigan State University. Western Michigan University has received program approval from the State Board of Education to institute an M.S.W. program and now plans to initiate it in Fall, 1969. In addition, some 12 Michigan colleges and universities are members of the Council of Social Work Education and offer courses with social welfare content.

Current enrollment figures show that about 60 percent of the graduate students in schools of social work are women. Most social work students at the graduate level receive financial support in the form of stipends, traineeships, etc., the chief source being federal grant programs. Some 80-85 percent of the master's degree candidates in Michigan schools of social work receive such aid. Traditionally, most students have majored in casework, but there is an increasing trend -- especially evident in the Michigan schools -- toward group work and community organization majors. Recent field placement data, which may be indicative of ultimate work situations, show that a large number of Michigan students (25 percent) take their field placements in psychiatric settings, but relatively few (8 percent) in other medical settings.

A new development in social work education is the two-year, associate degree program related to social services. An estimated 50 such programs are now underway throughout the country, in community colleges, and to some extent, in four-year institutions. These programs fall into two basic patterns: the general social services curriculum, and the specific, occupationally oriented curriculum, such as mental health aide or child care worker. No such programs are presently offered by any of Michigan's educational institutions although several have expressed interest. Ferris State College has submitted to the State Board of Education a proposal for a two-year, associate degree social service technician program. The Ferris State proposal appears to be carefully conceived and planned and has been developed with the assistance of experts in the field of social work.

There is an increasing recognition, particularly among the vanguard of the profession, that social work must become more concerned with the goal of making comprehensive services more widely available and must place increased emphasis on preventive services. Social work in all settings, including medical and psychiatric, has traditionally been rather rigidly structured within agency frameworks, and along bureaucratic lines. Recognition of the need for the professional (M.S.W.) social worker to become more involved in planning and consultation, if the goal of interrelatedness of services is to be met, will force changes in patterns of utilization of social work personnel. The trend will continue toward more delegation of direct service aspects and more routine functions of traditional casework to persons with baccalaureate level or less education.

Recommendations

A. Education

1. Western Michigan University should be encouraged and assisted in the development of their master's degree program in social work.

2. Existing graduate schools of social work (Michigan State, the University of Michigan, and Wayne State) should review their curricula with a view to weaving into the general fabric of their teaching program more emphasis on medical social work content. In addition, consideration should be given to drawing on the specialized curricula from other academic and clinical resources within the respective universities -- particularly the three medical schools and the School of Public Health at the University of Michigan.

3. The State Board of Education should support the development of the social service technician curriculum proposed by Ferris State College as a model associate degree program in social services. This proposal has been developed with assistance and technical guidance from several established graduate schools of social work as well as of public and private social agencies which would offer potential employment opportunities.

4. There is a need for a program of continuing education directed toward personnel at less than the M.S.W. level who are functioning as social workers in various medical settings. The three graduate schools of social work in the state may appropriately take the leadership in sponsoring seminars and workshops throughout the state in cooperation with such agencies as the State Department of Public Health, Mental Health, and Social Services, the Michigan Hospital Association, and the Michigan Social Work Council. Sources of financial support should be sought which would provide for an ongoing program.

B. Utilization

1. The advisory subcommittee established by the Michigan Department of Public Health to develop standards for "designated social workers" in extended-care facilities under Title XVIII of the Social Security Act should be urged to complete its work.

2. More rational patterns of utilization of professional and subprofessional workers in the social work field need to be developed for all health settings; the institutions or agencies involved should develop guidelines if the profession does not.

3. A meaningful accreditation plan for social work services in hospitals and clinics needs to be developed at the national level. The American Society for Hospital Social Work Directors (AHA) would be the appropriate body to develop standards for such accreditation. Michigan members of the Society might appropriately call this need to the attention of the national organization.

4. An inter-departmental committee should be appointed to include representatives of state agencies concerned with the provision of social services in medical and psychiatric settings (i.e. Departments of Social Services, Public Health, and Mental Health) and the Technical Division of the Department of Civil Service, such committee to be charged with review of the present job classification structure in social work with a view to establishing uniformity of job definitions and occupational nomenclature and to exploring measures to create or improve vertical and lateral mobility of personnel.

C. Additional Data and Research

1. As part of a statewide health manpower data bank there needs to be collected on a continuing basis data on the number, location and educational background of persons engaged in medical social work in Michigan.

2. Data are needed on the present patterns of utilization of social work personnel at varying levels of educational preparation in health related social service settings in order to develop plans for improving and systematizing their utilization.

3. The graduate programs in social work should consider undertaking a visitation program to general hospital social services departments in order to assess the programs which might provide appropriate clinical experience for students and to provide a feedback to the academic curriculum with respect to medical social service content.

SPECIALIZED REHABILITATIVE SERVICES

Introduction

At least six specialized rehabilitative professions have developed in the health field: (1.) corrective therapy, (2.) educational therapy, (3.) manual arts therapy, (4.) music therapy, (5.) recreational therapy, and (6.) homemaking rehabilitation consultant. These therapists are generally persons with specialized, clinically-oriented training in physical education (1. and 5.), special education (2.), industrial arts (3.), music (4.), or home economics (6.), respectively. To be recognized as a professional in any of these fields, a person must have an appropriate baccalaureate degree and clinical experience.

Trends Affecting Educational Planning

These professions are all relatively new and small, but growing. Most corrective, educational, and manual arts therapists are now employed by Veterans Administration hospitals and the only structured clinical training in these areas is conducted by V.A. hospitals. Michigan mental institutions are also seeking professionals in rehabilitation fields, particularly recreation therapy and music therapy. Increasing emphasis on community mental health programs is expected to increase demand for these therapists. At present, persons without specialized training in therapeutics must often be used to fill vacancies in health institutions. Recreation therapy is the largest of these professions and unmet demand for recreation therapists is quite substantial. The 1966 AHA-PHS Survey estimated additional needs in Michigan hospitals for 117 recreation therapists, an increase equivalent to 60 percent of the current employment level.

Music therapy has developed into a fairly structured profession, with professional registration and curriculum standards for the baccalaureate degree in music therapy. Two of the 11 undergraduate programs in music therapy are offered by Michigan institutions - Michigan State University and Western Michigan. The former institution has also initiated a master's degree program.

Degree programs in recreation therapy have also been developed at the baccalaureate and graduate levels, although the majority of recreation

therapists have acquired professional competence through experience in the clinical setting, following completion of a minimum of a baccalaureate-level education in physical education and/or recreation. The National Therapeutic Recreation Society (NTRS) has established a registry for professional recreation therapists at three levels, the "Director", which requires a master's degree plus 2 years' experience; the "Leader", which requires a bachelor's degree; and the "Aide", which requires a high school diploma plus 400 hours of inservice education. To date, the NTRS has registered some 300 persons in the above three categories. The NTRS is also developing standards for an undergraduate curriculum in recreation therapy and is currently developing a certification program to recognize facilities which meet standards for field work training of professional students in therapeutic recreation.

Recommendations

1. Development of a structured, undergraduate major in recreation therapy should be considered by one or more Michigan universities having a strong physical education and recreation department and resources in such allied fields as special education, occupational or physical therapy. Michigan State University is currently exploring such a program building upon existing course offerings in the Department of Health, Physical Education and Recreation. M.S.U. should be assisted in the development of a program leading to certification.

2. Efforts should be made to improve recruitment into the specialized rehabilitation fields through improved dissemination of information concerning career opportunities and educational requirements to secondary school students and to undergraduates enrolled in appropriate disciplines. The Michigan Department of Mental Health and other agencies utilizing such services should take the initiative in these efforts.

SPEECH PATHOLOGY AND AUDIOLOGY

Speech pathologists and audiologists are primarily concerned with disorders in the production, reception, and perception of speech and language. The national professional association for these specialists is the American Speech and Hearing Association (ASHA), membership in which encompasses the vast majority of persons professionally prepared in this specialty area. The ASHA awards two Certificates of Clinical Competence, one in speech pathology and one in audiology. Both require academic preparation at the marter's level, one year of experience in the field, and the successful passing of a national examination.

Membership in the Michigan Speech and Hearing Association (MSHA), the state affiliate of the ASHA, totaled approximately 640 in 1968. About two-thirds of these members were employed in public school settings. Educational programs for the preparation of speech and hearing therapists are offered by nine institutions of higher education in Michigan. Seven of these universities offer graduate education, and four of them, Wayne State University, the University of Michigan, Michigan State University, and Western Michigan University, offer doctoral programs.

The Michigan Department of Education certifies speech and hearing personnel to work in public school settings. The issue of standards for speech and hearing personnel in public schools in Michigan has recently undergone rather extensive study as a part of the activities of the Study Committee on Certification of Special Education Teachers, appointed by the Michigan Department of Education. An Ad Hoc Committee on the Training of Speech and Hearing Personnel to Work in Public Health Settings, under the chairmanship of Dr. David Prins of the University of Michigan, has reported to the parent committee regarding educational programs for the preparation of speech and hearing therapists to work in school settings. This report will be incorporated into a report of the Parent Study Committee to be submitted to the Michigan Department of Education in the near future. On the basis of the careful study of the area of speech and hearing services by the Ad Hoc Committee, it was the view of the staff and advisory committees of the Education for Health Care Project that the findings and recommendations of the Ad Hoc Committee Report are eminently sound and should be supported by the State Board of Education.

The report of Dr. Prins' committee identified the role of the speech and hearing therapist as follows:

1. "Identification and evaluation of persons with disorders and the specific types of services needed.

2. Mobilization and utilization of professional and community resources for the provision of preventive and rehabilitation services.

3. Consultation with other special education services.

4. Provision of public information programs.

5. Supervision of sub-professional personnel.

6. Provision of specific therapeutic assistance to:

    1) the child or adult with a communicative handicap,

    2) the family and environment."

With respect to the educational preparation of the speech and hearing therapist, the Ad Hoc Committee's report stated: "The minimal professional training program for the Speech and Hearing Therapist will need to provide a sound background in normal child development and the nature of speech, hearing, and language processes; followed by a range of experience in the management of communicative disorders to include training in the nature and treatment of specific communicative handicaps, the knowledge and utilization of ancillary professions, and the mobilization and organization of community services."

The Committee recommended specifically that a program totaling a minimum of 60 semester hours, including both basic and management areas, be provided which would be accompanied by broad academic experience in the liberal arts and sciences. The Committee recommended a minimum of 18 semester hours in basic areas related to human growth and development; basic speech, language, and hearing processes. They recommended further a total of 42 semester hours in management areas including the study of communicative disorders, case management, and administration of programs, knowledge and utilization of ancillary professions.

The report states further: "In addition to this program, the following clinical practicum experience is recommended as an integral part of the training program: Clinical practice experience should accompany, whenever possible, the case management courses. A minimum of 275 clock hours of direct case contact is recommended with individuals presenting disorders of communication. Within this 275 hours it is recommended that experience should be provided in working with cases having disorders of articulation, voice, stuttering, language, and hearing."

It therefore appears that the findings and recommendations of the Ad Hoc Committee represent an excellent basis on which the Department of Education can move to revise its certification standards for speech and hearing personnel.

VETERINARY MEDICINE

Introduction

Modern veterinary medicine is concerned with the health of all species of animals and with the relationship of animal diseases to human health.

The Michigan State Board of Veterinary Examiners provides for the examination and licensing of veterinarians, annually validates existing licenses, and maintains reciprocal licensing agreements with certain other states.

Michigan had 804 registered veterinarians in active practice in 1966. Of these, about 81 percent were engaged in private practice or employed by commercial establishments. Sixteen percent were employed by federal or state government, including Michigan State University. Three percent were retired.

Like other veterinary schools in the United States, the College of Veterinary Medicine at Michigan State University has reached maximum enrollment, based on present facilities and staffing, with its current total of from 300 to 350 students in residence. The average student receiving the Doctor of Veterinary Medicine degree at M.S.U. has had seven and one-half years of university study.

Trends in Area with Implications for Educational Planning

Manpower studies conducted by the American Veterinary Medical Association have predicted a shortage of 15,000 veterinarians within the next 15 years; yet, the Association reports that the 18 U.S. veterinary schools are currently able to accept only one out of four applicants for admission. Although each school sets its own priorities for admissions, various efforts are made in admitting students to meet the needs of those applicants from states lacking a school of veterinary medicine. A formal arrangement under the auspices of the Southern Regional Education Board enables students from each of the 14 states in that region to attend any of the five veterinary schools in the region on an in-state-basis. A similar arrangement obtains under the auspices of the Western Interstate Commission for Higher Education (WICHE). The Michigan State University

program has no such formal arrangements but the college does feel an obligation to give priority, after Michigan residents, to applicants from states which do not provide veterinary education.

The growing shortage of veterinarians is attributable to at least two factors: (1) An increasing demand for veterinarians in the traditional occupations of private veterinary practice, animal disease research, government-administered livestock disease control, and commercial employment by feed manufacturers, biological suppliers, and pharmaceutical companies. (2) The development of vast new areas of veterinary endeavor, including membership on public health teams, participation in basic medical research, operation and maintenance of health of laboratory animal colonies in biomedical research institutions, and increasing involvement in the most advanced developments in applied medical research such as organ transplantation, cancer therapy, and environmental toxicology.

The demand for more veterinarians likely will accelerate for several reasons. The increasing affluence of our society is producing higher personal incomes, shorter work weeks, earlier retirement, more leisure time -- all of which result in a demand for more pets and recreational animals and for higher quality diets which include more meat and dairy products. At the same time, specialization in veterinary medicine and surgery are developing rapidly and a more sophisticated public will demand more and better medical care for its personally owned animals.

Biomedical research based on laboratory animals is increasing at a fantastic rate. The growing influence of humane organizations is bringing about significant improvement in the care given these animals. Recent federal legislation relating to the testing and licensing of new drugs and vaccines has helped to multiply the numbers of laboratory animals used in research and development. The demand for veterinarians in research therefore is expected to increase, creating an urgent nationwide shortage.

In Michigan, budgeted positions in state agencies are not being filled in spite of beginning salaries which are commensurate with earnings in private practice. Most veterinarians graduating from Michigan State University still enter private practice, although a gradual shift toward research and public health work is anticipated for the future. There will continue to be far too few entering teaching as a career. With several new veterinary colleges being planned in other states, Michigan and the other states face a critical shortage of trained veterinary medical teachers.

Curriculums in veterinary medicine still emphasize training for private practice. Failure of the veterinary colleges to stress more strongly the relationship of modern veterinary medicine to human health and welfare may contricute indirectly to shortages of veterinarians in basic medical research, teaching, public health, and consumer protection.

Michigan State University has recently initiated a pilot program to train laboratory animal technicians. The program is one year in length,

including one quarter of work experience in an animal research facility. Selected students among the 18 currently enrolled will be encouraged to take an additional six months' training to qualify them to act as supervisors of other technicians. Although focused on research animal laboratory needs, the program is sufficiently broad based to permit students to go into large animal work or to function as supportive personnel to veterinarians in private practice.

Recommendations

A. Education

1. The shortage of trained faculty to staff new veterinary schools and to permit expansion of existing schools, coupled with the shortage of trained research veterinarians, indicate the need for an expanded post-doctoral program, as currently proposed by Michigan State University.

2. M.S.U. should explore the possibility of offering at least two undergraduate options: one for undergraduate veterinarian students who are preparing for private practice, and one for those who will go into teaching and research. Both options would expose students to the human health aspects of veterinary medicine, but the latter would prepare the student more appropriately for specialized post-doctoral training.

B. Utilization

1. A recruitment program, coupled with financial aid, is needed to encourage D.V.M.'s in private practice to return for post-graduate training in teaching and research. Stipends presently available for graduate work do not attract D.V.M.'s already in private practice. Such a post-graduate program might help correct the imbalance in distribution of manpower now existing between the area of education, public health, and research on the one hand and the area of private practice on the other.

2. The results of the MSU pilot program for laboratory animal technicians should be assessed with a view to extending the use of technicians to other aspects of veterinary practice -- notably meat inspection functions of public health agencies.

C. Research and Data

There is need for more precise data on job vacancies in government programs here and abroad, in research projects relating to human health, and in teaching. Such figures are essential if some of the serious manpower shortages in the field of veterinary medicine are to be recognized and met.

VISUAL CARE

Introduction

Eye care is the responsibility of two categories of health personnel. *Ophthalmologists* are physicians (both M.D. and D.O.) who specialize in the medical and surgical care of the eyes. They diagnose and treat all forms of eye conditions, including refractive error, and prescribe drugs and lenses. Most, but not all, ophthalmologists are in private practice. *Optometrists* examine eyes for refractive error and prescribe lenses, eye exercises or other treatment not requiring drugs or surgery. Most optometrists are self-employed but some work for established practitioners, health clinics, hospitals, optical instrument manufacturers, or government agencies.

A third category of personnel is involved in visual services, *dispensing opticians and optical technicians*. Opticians fit and adjust eye glasses according to prescription written by an ophthalmologist or optometrist; they do not examine eyes or prescribe treatment. The optical technician does mechanical grinding and polishing of the lenses and assembling in a frame. Dispensing opticians are employed in retail optical shops, optical laboratories, ophthalmic goods factories, and by ophthalmologists and optometrists who prescribe and service glasses for their patients.

An *orthoptist* is a technician whose primary concern is muscle imbalance of the eye. Certified to assist ophthalmologists, they work with M.D.'s and D.O.'s in hospitals and in private practice.

Educational Trends

There were 322 ophthalmologists, (312 M.D.'s and 10 D.O.'s) in Michigan in 1966. Since 1959, the supply of ophthalmologists has increased much more rapidly than the total physician supply. The number of optometrists in Michigan, on the other hand, has actually declined in the same period.

Ophthalmology residencies for M.D. candidates are offered in the affiliated hospitals of both Wayne State and the U-M Medical Schools and by three other Detroit hospitals and for D.O. candidates by Detroit Osteo-

pathic Hospital. The usual length of these residencies is three years, and all available places are generally filled.

Professional education for optometry is offered by ten accredited institutions in the U.S., none of which is in Michigan. A minimum of six years' educational preparation is required -- two years of preprofessional education in an accredited college and four years of professional optometric education. Five of the ten schools of optometry are university affiliated.

Although most opticians and optical technicians are trained in apprenticeships a few formal educational programs have been established -- one of them at Ferris State College, where an associate degree program in ophthalmic optics is offered.

Training in orthoptics is conducted through preceptorships of 13-15 months in length under the auspices of the American Orthoptic Council; the educational prerequisite is two years of college training. Two of the 24 approved preceptorships in the U.S. are in Michigan.

Relations Between Ophthalmology and Optometry

Both ophthalmologists and optometrists are educated and licensed to perform refractions and prescribe corrective lenses. Ophthalmologists, as medical practitioners, also diagnose and treat diseases of the eye.

There is reason to believe that a much more cooperative attitude is developing between the two professions, particularly in Michigan. In 1967, a Joint Interprofessional Committee was formed, composed of representatives of the Michigan Optometric Association and the Michigan Ophthalmological Society. The Joint Committee has been working toward solutions to such important issues as the appropriate training and duties for ophthalmic assistants -- subprofessionals who could function in both optometrists' and ophthalmologists' offices -- and the concept of the optometrist practicing in the same office with the ophthalmologist.

Increasingly, physicians are referring routine refraction cases to optometrists. Moreover, because of the differences in educational background of the two groups, optometrists tend to be more interested in such aspects of eye care as corrective exercises, while ophthalmologists usually prefer to concentrate on treating the pathology of the eye, for which they are uniquely qualified.

It is likely that ophthalmology will become more restrictive in the type of cases treated and that optometrists will increasingly take over the field of refractive services, including routine eye examinations.

Projected Demand

Factors affecting demand for health services generally -- population growth, increasing longevity, greater affluence, higher levels of education, removal of economic barriers to care, and the increasing role of government in financing health services -- will operate in the area of eye care as well.

The decline in numbers of optometrists in Michigan and the lack of a college of optometry in the state point to a future supply-demand squeeze with respect to eye care services of a nonmedical nature, particularly in the light of the trend for ophthalmologists to restrict their practice to nonroutine eye care.

Establishment of a college of optometry within the existing system of higher education would provide a source of trained manpower that demand factors indicate will be needed by the state in the years ahead. Other measures will be needed to increase productivity of both ophthalmologists and optometrists.

Recommendations

1. Expansion of medical education facilities in Michigan, including the development of the Michigan State University College of Human Medicine to a full degree Medical School, should be supported by the State Legislature. This expansion will also make possible establishment of additional residencies in ophthalmology in university-affiliated hospitals.

2. There is a need to develop a college of optometry in Michigan, and it should preferably be established within one of the three major universities having developed graduate programs and a medical school.

3. Although educational programs for assistants or technicians in optometry at the two-year, associate degree level have been established in other states (notably California, Florida, and Wisconsin), a specific recommendation concerning development of such programs in Michigan would appear to be premature. Rather, program development should await the outcome of the current efforts of the optometrists and ophthalmologists in Michigan to define the task requirements for the ophthalmic assistant, the training required to achieve the appropriate skill level, and the employment opportunities and salary levels that would be available. Thus, a curriculum could be developed to train persons to function in both the optometrist's and the ophthalmologist's office.

VOCATIONAL REHABILITATION COUNSELORS

Introduction

Most rehabilitation counselors are employed in state agencies administering the federally supported vocational rehabilitation program although many private rehabilitation agencies also have rehabilitation counselors. Rehabilitation services assist the individual with physical or mental disabilities in returning to normal living; it is the rehabilitation counselor's job to assist the handicapped individual in reevaluating and readjusting his vocational capacities. Information gained from interviews with the client is used in conjunction with medical, psychological and social data to evaluate the individual's capabilities and to determine the type of work suited to his capacities, interests and talents. When the handicapped person is ready for employment, the counselor assists in placing him and performs follow-up reviews of his adjustment to the job situation.

Trends Affecting Educational Planning

There is a serious shortage of rehabilitation counselors in the country; in 1965, there were 300 vacant, budgeted positions in federal/state rehabilitation programs, which employ about 68 percent of all counselors. Among the factors that will contribute to an increasing demand for counselors are the population growth, the extension of rehabilitative services to include a broader spectrum of disabled persons, and the growing public demand for social welfare programs in general.

The Manpower Task Force of the Michigan Department of Education's Vocational Rehabilitation Planning Program has issued a detailed report on manpower needs in vocational rehabilitation.1/

1/ Michigan Department of Education. Comprehensive Planning for Vocational Rehabilitation Services. *Task Force II - Rehabilitation Manpower.* Final Report. Lansing: 1968. (Processed)

The development of formal career positions for counselors of several levels of education, as proposed by the Task Force, promises to broaden the formal scope of recruitment for the field. Recent students of counseling's manpower problems are sensitive to the fact that the traditional division of labor, which assumed staff of equally trained professionals, may have had adverse effects on recruitment and retention of personnel. However, the profession may experience increasing difficulty in relying heavily on persons from the fields of psychology, social work, and education because of the growing manpower needs in those fields.

One report has suggested the need for state rehabilitation agencies to eliminate sex discrimination in hiring. Others have suggested more active college recruitment campaigns by the state civil service.

Recommendations

A. Education

1. Rehabilitation counseling, like other social service fields, might benefit from the development of a human service curriculum at the community college level, to provide subprofessional training for jobs in social work and counseling.

2. A positive program of recruitment aimed at familiarizing students with the rehabilitation counseling field, should be undertaken among undergraduates in such fields as psychology, sociology, education, and social work.

3. Present graduate programs at Michigan State University and Wayne State University should be encouraged to expand insofar as possible.

B. Utilization

Support should be given to the Manpower Task Force's recommendation that job restructuring be undertaken by the Civil Service Department which will allow state departments to use student interns (both for manpower shortages and as a recruitment device), encourage effective utilization of former clients and other indigenous personnel in subprofessional and nonprofessional capacities. With regard to the use of student intern programs as a recruitment device, it should be emphasized that only carefully planned and challenging assignments will contribute to this goal.

Recruitment of counselor aides should be encouraged. Both the Michigan Department of Education and the Department of Social Services Rehabilitation Programs should hire from indigenous populations they serve. Sheltered Workshops and other rehabilitation facilities should also consider more extensive use of aides.

SELECTED REFERENCES AND ACKNOWLEDGMENTS

Listed below are the major bibliographical references utilized in the preparation of this report. These references have been divided into two sections; the general references include data sources which were used in preparation of all sections of the report, while the special references are arranged under health field categories. Included in the latter section are the names of persons who provided information and consultation concerning the respective fields. The staff gratefully acknowledges its indebtedness to those many experts, without whose assistance it would have been impossible to compile the report.

General References

1. American Association of Junior Colleges and the National Health Council. *A Guide for Health Technology Program Planning.* Washington, D.C.: American Association of Junior Colleges, 1967.

2. American Medical Association. *The Graduate Education of Physicians.* The Report of the Citizens Commission on Graduate Medical Education Commissioned by the American Medical Association. August 1, 1966. (John S. Millis, President of Western Reserve University, Cleveland, Ohio, served as Chairman of the Commission. This report is often referred to as the Millis Report).

   In order to make an external examination of the state of medical education, the American Medical Association asked for the formation of the Citizens Commission on Graduate Medical Education (internship and residency) to make recommendations for the improvement of this phase of medical science. It was the conviction of the Commission that the profession of medicine should assume the responsibility of its standards of education and should have a mechanism adequate to the full discharge of these responsibilities. The recommendations of the Commission are designed to provide such a mechanism.

3. Arnold, Mary F., Dr. P.H., "Use of Management Tools in Health Planning," *Public Health Reports*, Vol. 83, No. 10, October, 1968.

4. Boulding, Kenneth E., "The Concept of Need for Health Services," *Milbank Memorial Fund Quarterly*, Vol. XLIV, No. 3, Part 2, July, 1966.

5. Coggeshall, Lowell T. *Planning for Medical Progress Through Education*. A report submitted to the Executive Council of the Association of American Medical Colleges, Evanston, Ill.: Association of American Medical Colleges, April, 1965.

   The report attempts to outline recent major trends in health care and to cite the important implications of these trends for medical education in general and for the Association of American Medical Colleges as the principal organization through which plans and action in the field of medical education are considered and correlated. After a review of the past and present roles of the Association, proposals are outlined which concern the course of future development of the Association of American Medical Colleges.

6. Darley, Ward and Somers, Anne R., "Medicine, Money and Manpower - the Challenge to Professional Education, *"New England Journal of Medicine*, Vol. 276: 1414-1423, June 22, 1967.

7. _____, "New Training for New Needs, *"New England Journal of Medicine*, 276: 1471-1478, June 29, 1967.

8. Drummond, Rev. E. J., S. J., "The Hospital School - As School," *Hospital Progress*, February, 1969.

9. Feldstein, Paul J., "Research on the Demand for Health Services," *Milbank Memorial Fund Quarterly*, Vol. XLIV, No. 3, Part 2, July, 1966.

10. Flexner, Abraham. *A Report Submitted to the American Medical Association by the Carnegie Foundation for the Advancement of Teaching. 1910.*

    The Foundation commissioned Abraham Flexner to undertake a thorough study of the approximately 150 medical schools then extant in the United States. The report was published at a time when there was general recognition among leaders in the profession of the need for action, and dramatic and revolutionary results were achieved promptly.

    His findings and recommendations focused on three concerns:

    The urgent requirement for stringent over-all raising of standards of admission and instruction.

    The importance of relating medical education to the universities and placing it under their jurisdiction,

as a discipline controlled and correlated with the liberal arts.

The need to provide full-time staff and facilities that would combine instruction and research in a setting that would provide experience in the laboratory and hospital as well as in the lecture hall.

11. Hershey, Nathan, LLB, "An Alternative to Mandatory Licensure of Health Professionals," *Hospital Progress*, March, 1969.

12. Hiestand, Dale, "Research into Manpower for Health Service," *Milbank Memorial Fund Quarterly*, Vol. XLIV, No. 4, Part 2, October, 1966.

13. Horowitz, Morris A. and Harold M. Goldstein. *Hiring Standards for Paramedical Manpower.* A Report to the U.S. Department of Labor, Manpower Administration. Boston, Mass.: Department of Economics, Northeastern University, 1968.

14. W. K. Kellogg Foundation. *Annual Report 1967.* Battle Creek, Michigan: W. K. Kellogg Foundation, 1967.

15. _____. *Annual Report 1968.* Battle Creek, Michigan: W. K. Kellogg Foundation, 1968.

16. Kinsinger, Robert E. *Education for Health Technicians - An Overview.* Washington D.C.: American Association of Junior Colleges, 1965.

17. _____ and Muriel Ratner. *Technicians for the Health Field: A Community College Careers Study Program.* New York, N.Y.: New York State Education Department, 1966.

18. Kissick, William L., "Health Manpower in Transition," *Milbank Memorial Fund Quarterly*, Vol. XLVI, No. 1, Part 2, January, 1968.

19. _____, "Forecasting Health Manpower Needs," Part I, "The Numbers Game is Obsolete," *Hospitals*, Vol. 41: 47-51, September 16, 1967.

20. _____, Part II, "How Imagination and Innovation can Help Bridge Manpower Gaps," *Hospitals*, Vol. 41: 76-78 and 83-146, October 1, 1967.

21. McCreary, John F., M.D., "The Health Team Approach to Medical Education," *Journal of the American Medical Association*, Vol. 206, No. 7, Nov. 11, 1968.

22. McNerney, Walter J. *et al, Hospital and Medical Economics: A Study of Population, Services, Costs, Methods of Payment, and Controls.* Vol. I, Chicago, Ill: Hospital Research and Educational Trust, 1962.

23. Mase, Darrel J. Ph.D., "The Growth and Development of the Allied Health Schools," *Journal of the American Medical Association,* Vol. 206, No. 7, Nov. 11, 1968.

24. Michigan Department of Education. *State Plan for Higher Education in Michigan.* Lansing, Michigan: Michigan Department of Education, 1969.

25. _____and Michigan Department of Commerce. *Michigan Technician Need Study.* Project Director, James D. Kelly. Big Rapids, Michigan: Office of Administrative Studies, Ferris State College, 1967.

26. Michigan Hospital Association. *Hospital Salary and Fringe Benefit Survey.* Lansing, Michigan: Michigan Hospital Association, 1966.

27. Nangle, Grace L. (ed.). *Health Occupations Education Centers, Report of a Seminar.* Columbus, Ohio: Center for Vocational Education, Ohio State University, 1967.

28. National Advisory Commission on Health Manpower. *Report of the National Advisory Commission on Health Manpower,* Vols. I and II. Washington, D.C.: U.S. Government Printing Office, 1968.

29. National Commission on Community Health Services. *Health Manpower: Action to Meet Community Needs.* Report of the Task Force on Health Manpower. Washington, D.C.: Public Affairs Press, 1967.

30. New York State Education Department. *Education for the Health Professions.* A Report to the Governor and the Board of Regents from the New York State Committee on Medical Education. Albany, New York: New York State Education Department, 1963.

31. The President's Commission on Heart Disease, Cancer and Stroke. *Report of the Subcommittee on Manpower, December, 1964.* Washington, D.C.: U.S. Government Printing Office, 1964.

32. Ratner, Muriel (ed.). *Estending Campus Resources: Guide to Using and Selecting Clinical Facilities for Health Technology Programs.* Washington, D.C.: American Association of Junior Colleges, 1968.

33. Reeder, Leo G., Roemer, Ruth and Hannah C. Sprowls. *Education of Health Manpower in California.* A Survey of Programs for Preparing Selected Categories of Personnel. Report for the California Committee on Regional Medical Programs. Los Angeles, California: Survey Research Center, University of California, Los Angeles, Study Series #101, 1968.

34. Selden, William K., Litt. D., LLD, "The Development of Professionalism in the Allied Health Field," *Journal of the American Medical Association,* Vol. 206, No. 7, Nov. 11, 1968.

35. Shaefer, M. and H. E. Hilleboe, "The Health Manpower Crisis - Cause or Symptom?," *American Journal of Public Health,* Vol. 57, January, 1967.

36. Skaggs, Kenneth G., Ed.D., "Allied Health Programs in the Junior Colleges," *Journal of the American Medical Association,* Vol. 206, No. 7, Nov. 11, 1968.

37. The Socio-Economic Research Section, Batelle Memorial Institute. *The Michigan Manpower Study - Phase I: Analysis of the Characteristics of Michigan's Labor Force in the Next 15 Years.* Columbus, Ohio: Batelle Memorial Institute, 1966.

38. Somers, Anne R., "Meeting Health Manpower Requirements Through Increased Productivity," *Hospitals* 42: 43-48, March 16, 1968.

39. State of Illinois Board of Higher Education. *Education in the Health Fields for State of Illinois.* Volumes I and II. Chicago, Ill.: Center for Health Administration Studies, The University of Chicago, and study's director, Dr. James A. Campbell, and staff, Presbyterian-St. Luke's Hospital, 1968.

40. U.S. Congress, Senate, Subcommittee on Employment and Manpower. *Allied Health Professions Personnel Training Act of 1966,* Hearings on S. 3102 and S. 509, 89th Congress, 2nd Session, March 31, 1961.

41. U.S. Department of Health, Education, and Welfare. Wilbur J. Cohen, Secretary. A Report to Congress. *Independent Practitioners Under Medicare.* December 28, 1968.

42. _____. A Report to Congress. *Personnel Qualifications for Medicare Personnel.* December, 1968.

43. _____. *Education for the Allied Health Professions and Services.* Report of the Allied Health Professions Education Subcommittee of the National Advisory Health Council. PHS Publication No. 1600. Washington, D.C.: U.S. Government Printing Office, 1967.

44. U.S. Department of Health, Education, and Welfare, Public Health Service. *Health Resources Statistics, Health Manpower, 1965; and, Health Resources Statistics, Health Manpower and Health Facilities, 1968.* PHS Publication No. 1509 and 1509, 1968 Edition. Washington, D.C.: U.S. Government Printing Office, 1967, 1969.

In 1967 the National Center for Health Statistics (NCHS) of the U.S. Public Health Service published its first report on Health Resources Statistics: *Health Manpower, 1965.* On the basis of enthusiastic reception by the public, NCHS decided to issue new editions annually and enlarge the scope to include data on facilities as well as manpower. As such, the report becomes a part of the general program of the NCHS to provide current statistics over a wide range of health areas as baseline data for the evaluation, planning, and administration of health programs.

45. _____, _____. Bureau of Health Manpower. *Health Manpower Perspectives: 1967.* PHS Publication No. 1667, Washington, D.C.: U.S. Government Printing Office, 1967.

46. _____. National Center for Health Statistics. State Licensing of Health Occupations. PHS Publication No. 1758. Washington, D.C.: U.S. Government Printing Office, 1967.

47. _____ and the American Hospital Association. *Manpower Resources in Hospitals - 1966.* Chicago: American Hospital Association, 1967.

48. U.S. Department of Labor, Bureau of Employment Security. *Health Careers Guidebook.* Washington, D.C.: U.S. Government Printing Office, 1965.

49. _____, Manpower Administration. *Dictionary of Occupational Titles, 1965.* Washington, D.C.: U.S. Government Printing Office, 1965.

The Dictionary was originally published in 1939 by the U.S. Employment Service and made available for the first time descriptive information concerning most jobs in the American Economy. In the third edition the world of work has been re-examined through an improved identification of jobs, their content and worker requirements. The occupational information in the Dictionary of Occupational Titles was developed and prepared by the U.S. Employment Service primarily for personnel engaged in placement, counseling, and related activities in public employment offices and for others concerned with the use of occupational information in vocational, personnel, and related services and activities.

50. _____, Office of Manpower Policy, Evaluation, and Research. Bulletin No. 14. *Technology and Manpower in the Health Service Industry, 1965-75.* Washington, D.C.: U.S. Government Printing Office, 1967.

51. _____ and the U.S. Department of Health, Education, and Welfare. *Training Health Service Workers: The Critical Challenge.* Proceedings of the Conference on Job Development and Training for Workers in Health Services. Washington, D.C.: U.S. Government Printing Office, 1966.

****

Selected References by Health Field

ADMINISTRATION OF HEALTH SERVICE

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CHIROPRACTIC

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H. Ronald Frogley, Palmer College of Chiropractic; Charles C. and Mae Lynch, Board of Chiropractic Examiners, Detroit.

References:

American Chiropractic Association. *Educational Standards for Chiropractic Colleges.* Des Moines, Iowa: American Chiropractic Association, 1964.

_____. *Educational Requirements for Licensure and Approved Colleges.* Des Moines, Iowa: American Chiropractic Association, 1966.

_____. *1967 Official Directory: Chiropractic Examining Boards and Basic Science Examining Boards.* Des Moines, Iowa: American Chiropractic Association, 1967.

AMA News, December 12, 1966, p. 9., "Chiropractic Termed 'Cult'".

Michigan Chiropractic Association. *1966 Licensee List.*

"Proceedings of the First National Congress of Chiropractic," *International Review of Chiropractic,* Vol. 21, No. 10, April, 1967.

Reed, Louis S. *The Healing Cults.* Chicago, Ill.: University of Chicago Press, 1932.

Stanford Research Institute. *Chiropractic in California.* Los Angeles, Calif.: Hayes Foundation, 1960.

DENTAL HEALTH SERVICES

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References:

American Dental Association, Bureau of Economic Research and Statistics. *Facts About States for the Dentists Seeking a Location.* Chicago, Ill.: American Dental Associationk 1965.

_____, _____. "1965 Survey of Dental Practice X Summary," *Journal of the American Dental Association,* Vol. 73, No. 5, Nov., 1966.

American Dental Association Council on Dental Education. *Annual Report on Dental Auxiliary Education 1967/68.* Chicago, Ill.: American Dental Association, 1968.

_____. *Annual Report on Dental Education, 1967/68- Part I.* Chicago, Ill.: American Dental Association, 1968.

_____. *Dental Students' Register,* 1965-66 and 1966-67 Editions. Chicago, Ill.: American Dental Association.

_____. *Policies and Guidelines for the Training of Dental Auxiliaries.* Third Edition. Chicago, Ill.: American Dental Association, 1966.

"American Dental Association Dental Health Program for Children," *Journal of the American Dental Association,* Vol. 74:3, February, 1967.

Blayney, J. R. and I. N. Hill, "Flourine and Dental Caries," a special issue of the *Journal of the American Dental Association,* Vol. 74:2, January, 1967.

"Conclusions and Recommendations for the Educational Training of Dental Laboratory Technicians," Reports of Councils and Bureaus, Council on Dental Education of the American Dental Association, *Journal of the American Dental Association*, Vol. 74, No. 3, February, 1967.

"Dental Laboratory Relations," Editorial, *Journal of the American Dental Association*, Vol. 74, No. 3, February, 1966.

"Dental Prepayment," Reports of Councils and Bureaus, Council on Dental Care Programs, *Journal of American Dental Association*, Vol. 74:3, February, 1967.

"The Dental Profession and the Dental Laboratory Industry," *Journal of the American Dental Association*, Vol. 74, No. 3, February, 1966.

Douglas, B. L. and S. B. Coppersmith, "The Impact of Water Fluoridation on the Practice of Dentistry for Children," *Journal of Dentistry for Children*, Vol. XXIII:2, March, 1966.

Forrest, Edward J., Durocher, Roy T., and Helen S. Morgan, "Dental Assisting - Oral Hygiene Training: A Model Program." *Journal of the American Dental Association*, Vol. 77, December, 1968.

Hendershot, L. C., "Dentistry in the Changing Social Order," Speech before the Honors Convocation, University of Michigan School of Dentistry, April 22, 1966.

Hollinshead, B. S. *The Survey of Dentistry*. Final Report, American Council on Education. Washington, D.C., 1961.

Michigan State Dental Association. *A Dental Charter for the Children of Michigan*. Committee on Dental Care, Michigan State Dental Association, Second Draft, August 19, 1966.

Moen, B. Duane, "The Demand for Dental Care in 1975," Speech presented at Annual Meeting of American Dental Trade Association Manufacturers Section, September 1, 1964.

Podshadley, Dale W., "A Census of Dental Resources," *Journal of the Michigan State Dental Association*, Vol. 42, No. 7-8, July-August, 1960.

Smith, J. M. "The Growth of Dental Prepayment Plans," *Proceedings of the Workshop on Future Requirements of Dental Manpower...*, University of Michigan W. K. Kellogg Foundation Institute for Graduate and Postgraduate Dentistry, Ann Arbor, 1962.

"Survey of the Dental Laboratory Industry, 1966," *Journal of the American Dental Association*, Vol. 74, No. 3, February, 1967.

Szwedja, L. F. *et al*, "Michigan Dental Survey of Residents of Nursing Homes and Homes for the Aged," *Journal of the Michigan State Dental Association*, Vol. 45, May, 1963.

_____. "Estimates of Costs of Dental Care for Michigan Aged," Michigan Department of Public Health, July 22, 1963 (processed).

U.S. Public Health Service, NCHS. *Selected Dental Findings in Adults by Age, Race, and Sex*, PHS Pub. No. 1000, Series 11 - No. 7, February, 1965.

University System, State of Georgia. *Proposal for Dental Hygiene Programs*. Prepared by the faculty of the School of Dentistry, Medical College of Georgia, March 9, 1967.

DIETETIC AND NUTRITIONAL SERVICES

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References:

American Dietetic Association. *Dietetic Internship Approved by the Executive Board of the American Dietetic Association.* Chicago, Ill.: American Dietetic Association, 1965.

Beeuwkes, A., Yakel, R. M., and A.D.A. Executive Board, "A Look at Ourselves," *Journal of the American Dietetic Association*, Vol. 41, No. 6, December, 1962.

"Duties and Responsibilities in the Department of Dietetics," *Journal of the ADA*, Vol. 46, No. 23, March, 1965.

"Food Service Management in Hospitals," *Journal of the ADA*, Vol. 44, No. 4, April, 1964.

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References:

American Society of Safety Engineers, *Constitution and By-Laws.*

Environmental Engineering Intersociety Board, Inc. *American Academy of Environmental Engineers, Roster 1967.* Washington, D.C.: Environmental Engineering Intersociety Board, Inc.

_____. *The Diplomate,* Vol. 2, No. 2, December, 1967. Washington, D.C.: Environmental Engineering Intersociety Board, Inc.

_____. *Requirements for Certification in Various Fields of Environmental Engineering and Membership in the American Academy of Environmental Engineers.* Washington, D.C.: Environmental Engineering Intersociety Board, Inc.

_____. *Study Conference on the Graduate Education of Sanitary Engineers, May 27-29, 1960.* Washington, D.C.: Environmental Engineering Intersociety Board, Inc.

"Environmental Health," *Research News,* Vol. XVIII, No. 3, Ann Arbor, Michigan: Office of Research Administration, the University of Michigan.

"Graduate Curricula in Water Quality Engineering and Management," Statement presented to the Department of Interior, Nov., 1967, by the American Association of Professors in Sanitary Engineering.

"National Sanitation Foundation Launches a New Program," *American Journal of Public Health,* Vol. 57, No. 10, October, 1967, p. 1766. *Journal of Environmental Health,* Vol. 30, No. 1, July-August, 1967.

Shepard, W. P., Draw, C. W. and R. H. Elling, "A Study of Public Health Careers: Some Characteristics of Industrial Hygienists," *Industrial Hygiene*, Vol. 28, No. 4, November-December, 1967.

Tarrants, William F., "Current Trends and Philosophies in Safety Engineering Education," *Journal of the American Society of Safety Engineers*, October, 1963.

"A Tentative Description of the Functions of the Safety Position in Industry," *Journal of the American Society of Safety Engineers*, October, 1965.

U.S. Department of Health, Education, and Welfare, Public Health Service. *Facing the Challenge of Environmental Health*. Washington, D.C.: U.S. Government Printing Office, 1963.

_____, _____. *Improving Health Through the Radiological Sciences*. A Report to the Surgeon General prepared by the National Advisory Committee on Radiation. Washington, D.C.: U.S. Government Printing Office, 1966.

_____, _____. *Your Career in Sanitary Engineering*. Washington, D.C.: U. S. Government Printing Office, 1964.

LIBRARY SERVICES

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References:

Lieberman, Irving (ed.). *Proceedings of an Invitational Conference on Education for Health Sciences Librarianship*, September 10-12, 1967. Seattle, Washington: School of Librarianship, University of Washington, 1968.

Medical Library Association, Inc., "Code for the Training and Certification of Medical Librarians," *Bulletin of the Medical Library Association*, Vol. 52, No. 4, October, 1964.

Special Libraries Association. *Activities and Organization*. New York: Special Libraries Association, April, 1966.

MEDICAL ENGINEERING

Acknowledgments:

Glen Edmondson, University of Michigan; Dr. L. M. Thomas, Wayne State University.

References:

Payne, James E. "Birth of a Giant: Biomedical Engineering," *Steelways*, May-June, 1965.

MEDICAL LABORATORY AND RELATED SERVICES

Acknowledgments:

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References:

National Committee for Careers in Medical Technology. *National Correlations in Medical Technology Education*. A report of a study of medical technologists conducted by The National Council on Medical Technology Education. Memphis, Tenn.: Public Health Service Grant 5514-C-67, National Committee for Careers in Medical Technology, 1967.

_____. *Report of a National Study of Cytotechnologists: Education and Performance Relationships*. Conducted by The National Council on Medical Technology Education. Memphis, Tenn.: National Committee for Careers in Medical Technology, 1968.

_____ and National Council on Medical Technology Education. *Work Experience of Certified Laboratory Assistants*. Bethesda, Md.: National Council on Medical Technology Education, January, 1969.

U.S. Department of Health, Education, and Welfare, Public Health Service. *Manpower for the Medical Laboratory*. Proceedings of a Conference of Government and the Professions in Washington, D.C., October 11-13, 1967. Washington, D.C.: U.S. Government Printing Office, 1968.

U.S. Department of Labor, Manpower Administration. *Laboratory Assistant Field Project*. Final Report. Submitted by National Committee for Careers in Medical Technology, June 30, 1968.

MEDICAL RECORDS SERVICES

Acknowledgments:

Laura A. Biglow, American Association of Medical Record Librarians, Chicago, Ill.; William H. Kincaid and Vergil Slee, M.D., Commission on Professional and Hospital Activities, Ann Arbor.

References:

American Association of Medical Record Librarians. *Accredited Schools for Medical Record Librarians.* Chicago, Ill.: American Association for Medical Record Librarians, 1965.

Kincaid, William H. The Changing Role of the Medical Record Librarian," *Hospital Progress*, October, 1967.

MEDICINE AND OSTEOPATHY

For selected references and acknowledgments see:

Citizens Committee on Education for Health Care. *Recommendation Concerning the Proposal for a Full-Degree Medical Program at Michigan State University.* A report to the State Board of Education by the Citizens Committee on Education for Health Care. Lansing, Michigan: Department of Education, 1966.

Staff of the Citizens Committee on Education for Health Care. *Osteopathy in the United States and Michigan.* A staff report from the Citizens Committee on Education for Health Care for presentation to the State Board of Education. Lansing, Michigan: Department of Education, 1967.

NURSING AND RELATED SERVICES

For selected references and acknowledgments see:

Advisory Committee on Nursing Education to the Citizens Committee on Education for Health Care. *Nursing Education Needs in Michigan.* Report of the Advisory Committee on Nursing Education (Provisional), June, 1969. (processed).

OCCUPATIONAL THERAPY

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References:

Adamson, Margaret J., OTR and Mary Alice Anderson, OTR. "A Study of the Utilization of Occupational Therapy Assistants and Aides," *American Journal of Occupational Therapy*, Vol. XX, 2, March-April, 1966.

Flint, Robert T. and Karen C. Spensley. "Career Patterns of Minnesota Occupational Therapists," *American Journal of Occupational Therapy*, Vol. XXII, 1, January-February, 1968.

Michigan Department of Public Health, "Occupational Therapist," (Employment Brochure, 1968).

"Training Programs for O.T. Assistants," American Occupational Therapy Association, March, 1966 (mimeograph).

ORTHOPEDIC AND PROSTHETIC APPLIANCE-MAKING

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References:

American Board of Certification in Orthotics and Prosthetics, Inc. *1967 Registry of Certified Facilities and Individuals in Orthotics and Prosthetics*. Washington, D.C.: American Board for Certification in Orthotics and Prosthetics, Inc.

U.S. Department of Health, Education, and Welfare, Social and Rehabilitation Service. *Traineeships in Prosthetics and Orthotics, September, 1967*, Rehabilitation Services Administration, Division of Training, Washington, D.C.

PHARMACY

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References:

Addis, Joseph A., "Annual Pharmacy Lectures," University of Michigan, Ann Arbor, October 19, 1966.

Fischelis, Robert P., "Manpower for American Pharmacy," *Public Health Reports*. Vol. 78, No. 5, May, 1963.

National Association of Boards of Pharmacy, *1965 Proceedings*. March 8-31, 1965.

Provost, George P., Editorial, "Through the Looking Glass," *American Journal of Pharmacy*, Vol. 24, November, 1967.

PHYSICAL THERAPY

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References:

American Physical Therapy Association. *Training and Utilization of the Physical Therapy Assistant: Policy Statement*, July 5, 1967.

_____, Committee on Basic Education. "Education for Physical Therapy," *Journal of the American Physical Therapy Association*, Vol. 49, No. 8, November, 1968.

_____, Committee on Supportive Personnel. "Philosophy and Purposes of an Educational Program for Physical Therapy Assistants; Criteria for Faculty of a Physical Therapy Assistant Program; Criteria for Clinical Facilities in the Physical Therapy Assistant Programs; and Model Job Description for the Physical Therapy Assistant," October, November, 1968.

Fenderson, Douglas A. and Corrine W. Larson, "Planning and Establishing a Physical Therapy Assistant Program," *Journal of the American Physical Therapy Association*, Vol. 48, No. 9, December, 1968.

PODIATRY

Acknowledgments:

The Advisory Committee on Medical Education.

References:

Woodside, Nina B., M.D., M.P.H. and Jerome Shipiro, Pod. D., "Podiatry Services at Clinics of a Local Health Department," *Public Health Reports*, Vol. 82, No. 5, May, 1967.

PSYCHOLOGY

Acknowledgments:

Dr. Sherman Nelson, Department of Mental Health, Lansing.

References:

American Psychological Association. *American Psychological Association 1966 Directory*. Edited by John A. Lazo. Washington, D.C.: American Psychological Association.

Michigan Department of Mental Health Task Force on Manpower. *Development of Comprehensive Mental Health Programs in Michigan*, Vol. 1, Part II. Lansing, Michigan: Michigan Department of Mental Health, 1965.

Michigan Departments of Public Health and of Mental Health. *Michigan State Plan for the Construction of Community Health Facilities, 1965-66*. Lansing, Michigan: Michigan Department of Public Health and Michigan Department of Mental Health, 1966.

U.S. Department of Health, Education, and Welfare. *Mental Health Manpower - Current Statistical and Activities Report*. Washington, D.C.: U.S. Government Printing Office, 1965.

RADIOLOGIC TECHNOLOGY

Acknowledgments:

Walter M. Whitehouse, M.D., Chairman, Department of Radiology, University of Michigan.

References:

American Society of Radiologic Technologists. *The American Registry of Radiologic Technologists, 1965-66*, Minneapolis, Minn.

U.S. Department of Health, Education, and Welfare, Public Health Service. *Protecting and Improving Health Through the Radiological Sciences*. A Report to the Surgeon General prepared by the National Advisory Committee on Radiation. Washington, D.C.: U.S. Government Printing Office, 1966.

SOCIAL WORK

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References:

Barker, Robert L. and Thomas L. Briggs. *Trends in the Utilization of Social Work Personnel: An Evaluative Research of the Literature*. New York, N. Y.: National Association of Social Workers, Research Report No. 2, (processed).

Michigan Departments of Public Health and of Mental Health. *Michigan State Plan for the Construction of Community Health Facilities, 1965-66*. Lansing, Michigan: Michigan Departments of Public Health and of Mental Health, 1965.

U.S. Department of Health, Education, and Welfare. *Closing the Gap in Social Work Manpower*. Report of the Departmental Task Force on Social Work, Education, and Manpower. Washington, D.C.: U.S. Government Printing Office, 1965.

_____. "Selected Characteristics of Social Workers," *Mental Health Manpower*. Current Statistical and Activities Report, No. 6. Washington, D.C.: U.S. Government Printing Office, 1965.

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References:

Association for Physical and Mental Rehabilitation, Inc. "Corrective Therapy Clinical Training Affiliations" (n.d. mimeographed).

_____. "Requirements for Corrective Therapy Preparation," 1959, (mimeographed).

Michel, Donald E., "Professional Profile: The NAMT Member and His Clinical Practice in Music Therapy," *Journal of Music Therapy*, Vol. II, No. 4, December, 1965.

SPEECH PATHOLOGY AND AUDIOLOGY

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References:

Ad Hoc Committee on the Training of Speech and Hearing Personnel to Work in Public School Settings, (David Prins, Chairman) *Committee Report*, (processed, February, 28, 1969).

Michigan Department of Education, Rules and Regulations Governing Educational Programs under the Provisions of Act 269 PA 1955. *Educational Program for Pupils Who Need Speech Correction*, Lansing, Michigan, August, 1966.

MSHA, *Journal of the Michigan Speech and Hearing Association*, Vol. 4, No. 1, April, 1968.

Superintendent of Public Instruction, "Speech Correction," Lansing, Michigan, September, 1964.

VETERINARY MEDICINE

Acknowledgments:

Dean Willis W. Armistead, College of Veterinary Medicine, Michigan State University.

References:

Center for Laboratory Animal Resources. *Clar Report*, No. 1, Michigan State University, East Lansing, Michigan, 1968.

Hearings Before the Subcommittee on Employment and Manpower of the Committee on Labor and Public Welfare, U.S. Senate, 89th Congress, U.S. Government Printing Office, 1966.

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References:

A.M.A. Directory of Approved Internships and Residencies, 1967-68. Chicago: American Medical Association.

American Optometric Association, *Optometry, A Career with Vision.* St. Louis, Mo.: American Optometric Association.

_____, *A Re-Evaluation of the Ratio of Optometrists to Population in the United States in the Light of Socio-Economic Trends in Health Care.* Reprinted from the January, February and March 1969 issues of the *American Journal of Optometry* and the *Archives of American Academy of Optometry*, incorporating corrections published in the June, 1966 issue. St. Louis, Mo.: American Optometric Association.

_____, "Services of Optometrists Performing Health Services in Independent Practice." Report submitted to the Public Health Service by the American Optometric Association, August 1, 1968.

American Osteopathic Association, "Requirements for Certification American Board of Ophthalmology and Otorhinolaryngology." Chicago, Ill.: Board of Trustees of the A.O.A. and Advisory Board of Osteopathic Specialists, 1965.

Guild of Prescription Opticians. *What is an Optician?* Washington, D.C.: Guild of Prescription Opticians, 1962.

Peters, Henry B., O.D., M.A. "Vision Care of Children in a Comprehensive Health Program," *Journal of the American Optometric Association*, Vol. 3, No. 12, December, 1966.

U.S. Department of Health, Education, and Welfare, Public Health Service, National Center for Health Statistics. *Characteristics of Patients of Selected Types of Medical Specialists and Practitioners*. Series 10, No. 28, May, 1966.

VOCATIONAL REHABILITATION

Acknowledgments:

Paul C. Wright, Division of Vocational Rehabilitation, Michigan Department of Education; W. Alfred McCauley, Executive Director, National Rehabilitation Counseling Association.

References:

State of Michigan, Department of Education, Manpower Task Force Final Report. *Planning for Vocational Rehabilitation Service*. Lansing, Michigan: 1968.

APPENDIX TO EDUCATION FOR HEALTH CARE IN MICHIGAN

APPENDIX - LIST OF EXHIBITS

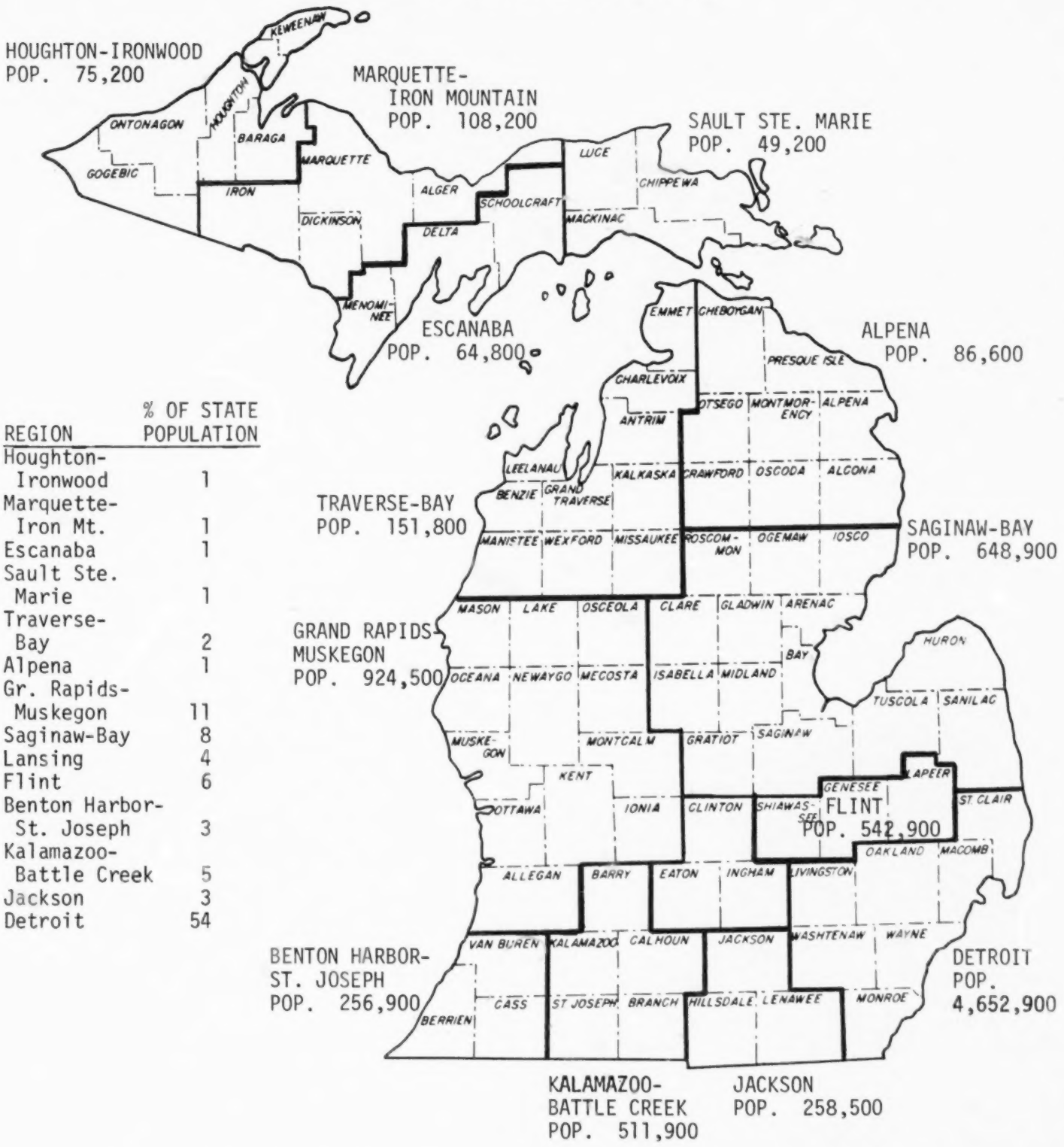
	PAGE
Appendix A - Michigan Population	143
Figure 1 - Michigan Population by Region, 1967	145
Figure 2 - Michigan Population by Region, 1960-1990	147
Figure 3 - Michigan Population by Age, 1960-1990	148
Table 1. - Michigan Population by County, 1960-1990	149
Appendix B - Health Manpower in Michigan by Region and County	153
Table B-1. Major Provisions of Michigan Licensing Statutes Affecting Health Occupations	157
Table B-2. Health Manpower in Michigan by Region and County	
Part 1	159
Part 2	163
Part 3	167
Part 4	172
Table B-3. Manpower Resources in Michigan Hospitals by Region and County	
Part I	177
Part II	181
Table B-4. Manpower Resources and Needs in Michigan Hospitals by Region, 1966	185
Appendix C - Educational Programs Preparing Health Manpower in Michigan	191
Figure 1 - Location of Michigan Public Baccalaureate Colleges and Universities, 1969	193
Figure 2 - Location of Private Colleges in Michigan	194
Figure 3 - Operating Community College Districts in Michigan, September, 1969	195
Table C-1. Program Offerings in Selected Health Fields in Michigan: Fall, 1969	197
Table C-2. Certificates and Degrees Awarded in Selected Health Fields in Michigan, by School, 1966-67, 1967-68	201

APPENDIX A

MICHIGAN POPULATION BY REGION AND COUNTY

APPENDIX A - FIGURE 1

MICHIGAN POPULATION BY REGION, 1967 1/



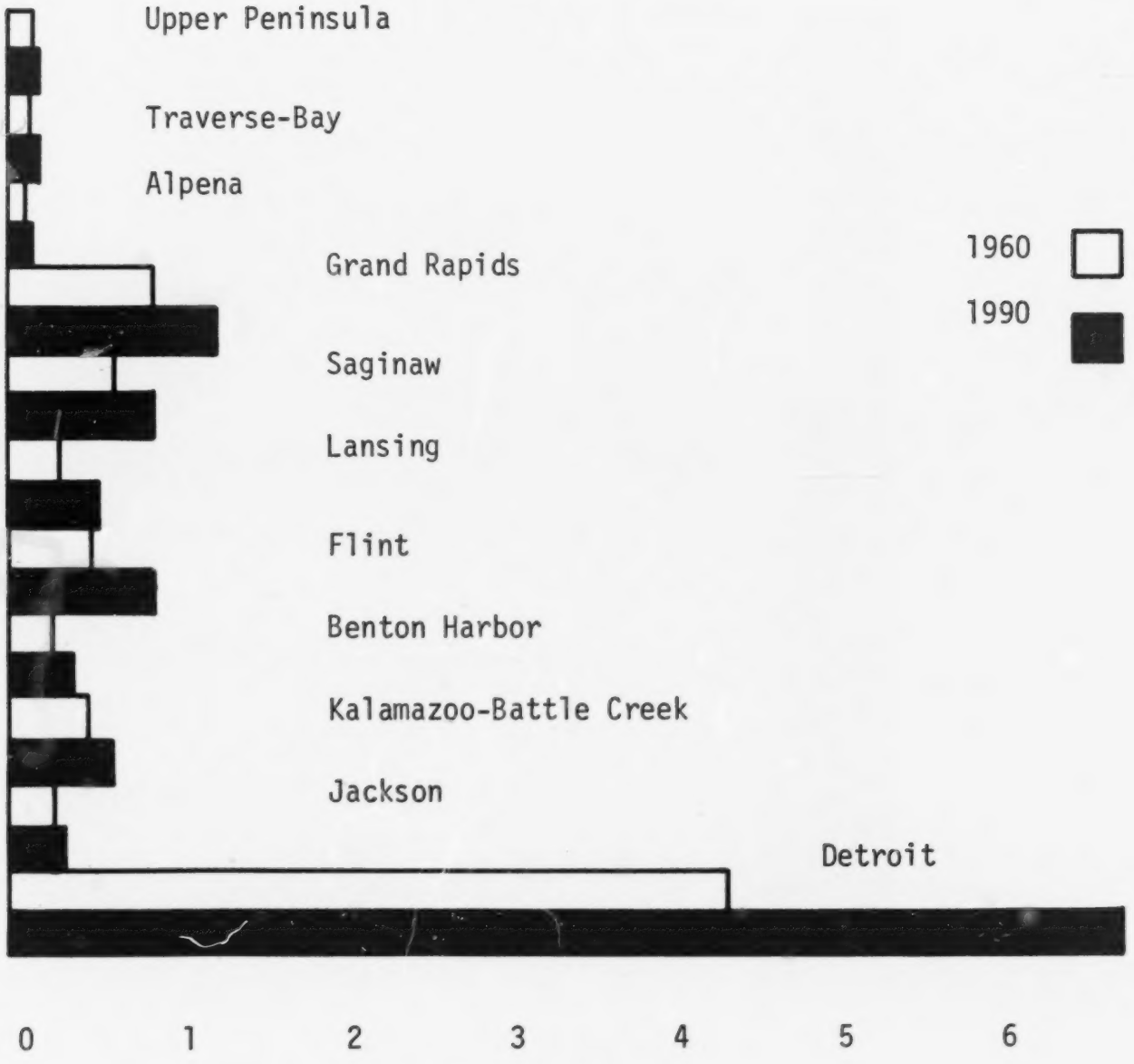
REGION	% OF STATE POPULATION
Houghton-Ironwood	1
Marquette-Iron Mt.	1
Escanaba	1
Sault Ste. Marie	1
Traverse-Bay	2
Alpena	1
Gr. Rapids-Muskegon	11
Saginaw-Bay	8
Lansing	4
Flint	6
Benton Harbor-St. Joseph	3
Kalamazoo-Battle Creek	5
Jackson	3
Detroit	54

1/ Regions are state planning and development regions identified in Governor's executive order No. 1968-1 dated February 12, 1968.

Source: Population estimates prepared by the Center for Health Statistics, Mich. Dept. of Public Health, for the Office of Planning Coordination, Lewis Cass Bldg. Lansing, Michigan (memorandum dated October 2, 1968).

APPENDIX A - FIGURE 2

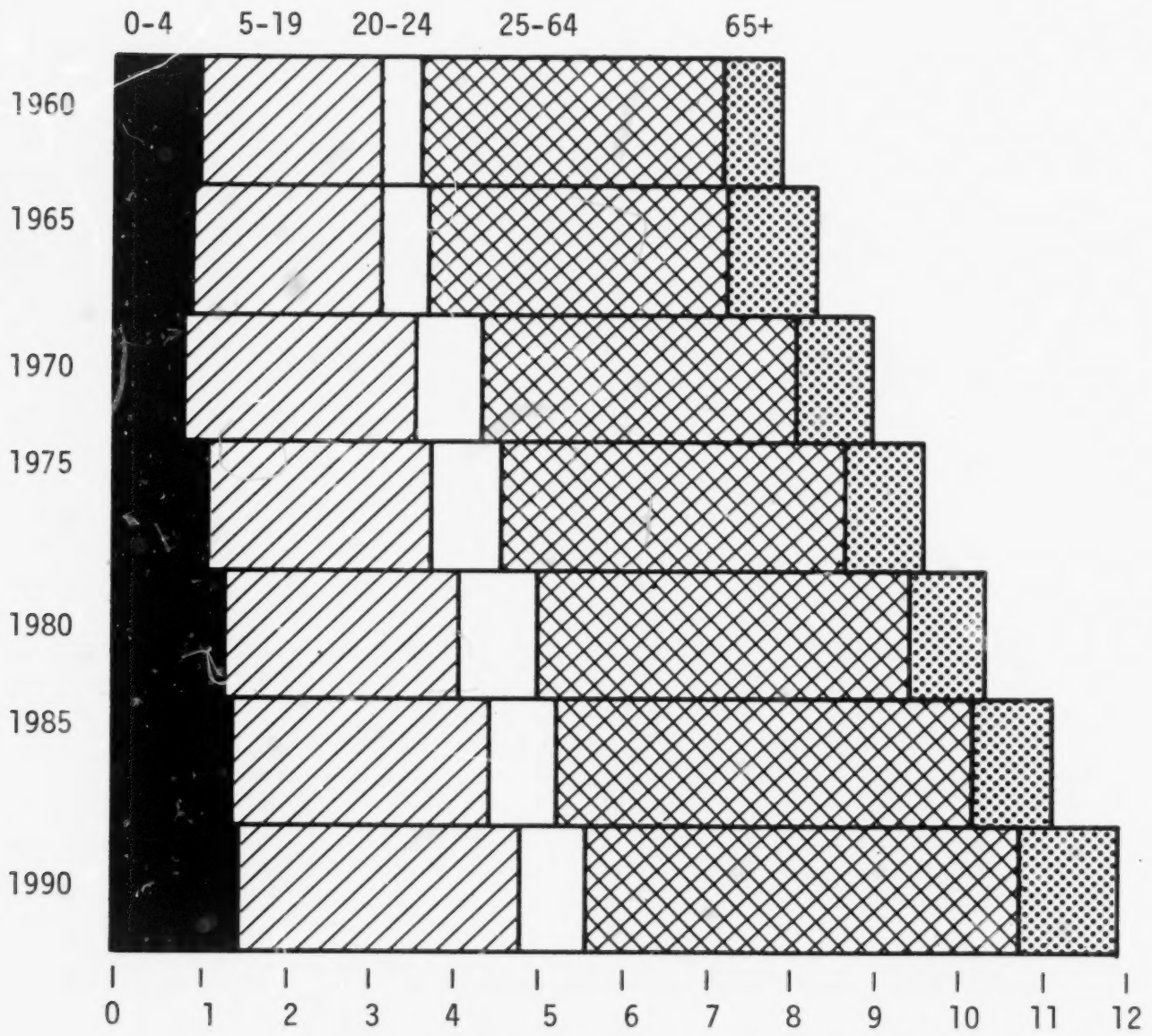
MICHIGAN POPULATION BY REGION: 1960-1990



Source: State of Michigan, Office of Planning Coordination, Bureau of Planning and Program Development, and Budget Division, Bureau of the Budget memorandum, June 12, 1969

APPENDIX A - FIGURE 3

MICHIGAN POPULATION BY AGE: 1960 - 1990



Source: See Figure 2.

APPENDIX A - TABLE I

Michigan Population by Region and County, 1960-1990 (in 000's)

Region-County	1960	1970	1975	1980	1985	1990	% of change 1960-1990
HOUGHTON-IRONWOOD							
Baraga	7	8	8	8	8	8	
Gogebic	24	19	18	18	18	17	
Houghton	36	34	34	34	35	35	
Keewenaw	2	2	2	2	2	2	
Ontonagon	11	11	12	12	13	13	
Subtotal	80	74	74	74	76	76	-5
MARQUETTE-IRON MT.							
Alger	9	8	8	8	8	8	
Dickinson	24	23	23	24	24	25	
Iron	17	16	17	18	19	20	
Marquette	56	70	77	84	92	100	
Subtotal	107	118	125	134	144	152	43
ESCANABA							
Delta	34	34	34	35	36	37	
Menominee	25	25	25	26	27	28	
Schoolcraft	9	8	8	8	8	8	
Subtotal	68	67	67	69	71	72	6
SAULT STE. MARIE							
Chippewa	33	36	37	39	42	44	
Luce	8	7	7	7	7	7	
Mackinac	11	10	11	11	11	12	
Subtotal	51	54	55	57	61	63	23
TRAVERSE-BAY							
Antrim	10	10	11	11	11	12	
Benzie	8	8	8	8	8	8	
Charlevoix	13	14	15	16	16	17	
Emmet	16	17	17	18	18	19	
Grand Traverse	33	39	41	44	47	50	
Kalkaska	4	5	5	5	5	6	
Leelanau	9	10	10	11	11	12	
Manistee	19	20	20	21	22	23	
Missaukee	7	6	6	6	6	6	
Wexford	18	19	19	20	21	21	
Subtotal	139	148	152	159	166	172	24
ALPENA							
Alcona	6	6	6	6	6	6	
Alpena	29	31	32	34	36	37	
Aheboygan	15	14	14	14	14	15	
Crawford	5	6	6	6	7	7	
Montmorency	4	4	4	4	4	4	
Oscoda	3	4	4	4	4	4	
Otsego	8	9	10	11	11	12	
Presque Isle	13	13	14	15	15	16	
Subtotal	83	86	89	94	98	102	23

APPENDIX A - TABLE 1 (CONT.)

Michigan Population by Region and County, 1960-1990 (in 000's)

Region-County	1960	1970	1975	1980	1986	1990	% of change 1960-1990
GRAND RAPIDS-MUSK.							
Allegan	58	62	64	68	72	76	
Ionia	43	47	49	51	54	56	
Kent	363	415	444	477	511	543	
Lake	5	5	5	6	6	6	
Mason	22	22	23	24	24	25	
Mecosta	21	23	24	26	27	28	
Montcalm	36	40	42	44	47	49	
Muskegon	150	160	168	178	188	197	
Newaygo	24	26	27	29	31	32	
Oceana	17	16	16	17	17	17	
Osceola	14	14	15	15	16	16	
Ottawa	99	121	133	145	158	171	
Subtotal	851	953	1010	1080	1152	1217	43
SAGINAW-BAY							
Arenac	10	10	10	10	11	11	
Bay	107	111	116	122	128	133	
Clare	12	13	13	14	15	16	
Gladwin	11	11	11	11	12	12	
Gratiot	37	40	41	43	46	47	
Huron	34	35	36	37	39	40	
Iosco	17	26	31	36	41	47	
Isabella	35	39	41	43	47	48	
Midland	51	61	68	74	81	88	
Ogemaw	10	9	9	9	9	10	
Roscommon	7	8	9	9	10	10	
Saginaw	191	221	237	255	273	290	
Sanilac	32	35	36	38	40	41	
Tuscola	43	46	48	51	54	56	
Subtotal	597	665	705	753	804	821	71
LANSING							
Clinton	38	49	54	59	64	69	
Eaton	50	61	67	73	79	85	
Ingham	211	259	282	307	333	358	
Subtotal	299	370	403	439	476	512	71
FLINT							
Genesee	374	474	521	575	632	688	
Lapeer	42	47	50	53	56	59	
Shiawasee	53	60	63	68	72	76	
Subtotal	470	582	634	696	760	823	75
BENTON HARBOR-ST. JOS.							
Berrien	150	173	185	199	214	228	
Cass	37	42	44	48	51	54	
Van Buren	48	55	58	63	67	71	
Subtotal	235	269	288	309	332	353	50

APPENDIX A - TABLE 1 (CONT.)

Michigan Population by Region and County, 1960-1990 (in 000's)

Region-County							
KALAMAZOO-BATTLE CR.	1960	1970	1975	1980	1985	1990	% of change 1960-1990
Barry	32	30	31	32	33	34	
Branch	35	38	40	43	46	48	
Calhoun	139	143	148	153	162	168	
Kalamazoo	170	197	213	231	249	267	
St. Joseph	42	46	48	51	54	57	
Subtotal	418	454	479	509	543	573	37
JACKSON							
Hillsdale	35	34	35	36	38	38	
Jackson	132	138	144	150	160	167	
Lenawee	78	78	81	85	88	92	
Subtotal	245	250	260	271	286	297	21
DETROIT							
Livingston	38	46	51	56	61	67	
Macomb	406	664	806	991	1105	1280	
Monroe	101	118	127	138	149	159	
Oakland	690	918	1038	1180	1290	1424	
St. Clair	107	112	116	122	127	132	
Washtenaw	172	228	265	312	365	424	
Wayne	2667	2706	2756	2805	2968	3048	
Subtotal	4181	4791	5160	5603	6066	6535	56
STATE TOTALS[1/]:	7863	8881	9502	10248	11034	11769	50

Source: See Figure 2, Appendix A.

1/ Column figures may not add due to rounding.

APPENDIX B

Health Manpower in Michigan by Region and County

Appendix B contains four sets of tables. Table B-1 outlines the scope and content of licensure laws for each of the sixteen health professions and occupations licensed in Michigan. Table B-2, in four parts, shows the supply and distribution of manpower in thirty-two health fields.

Unless otherwise noted the data in B-2 describe the total supply of active manpower in each field. The chief sources of data were licensure boards, professional associations, and professional registers. Each of these sources has strengths and weaknesses and these characteristics vary among health fields. With the exception of medicine, dentistry, nursing, and dietetics, complete data on the supply of active health personnel by geographic location and work setting are difficult to obtain. Membership lists from some associations such as the American Dietetic Association provide relatively complete information on manpower supply by location and work setting. Other association rosters may lack subclassification or be incomplete, perhaps by omitting a significant number of nonmembers or uncertified personnel.

Licensure boards differ in the amount and type of data collected. Generally, licensure data is collected on a headcount basis with no breakdown as to work status or setting. The Michigan Board of Nursing which collects detailed data is one exception. However, to date the nursing information has not been fully automated and the available statistics show only name and location. Data on Michigan nursing personnel by educational level, work setting, and type of position can be obtained from the American Nurses Association, but a breakdown by geographic location within the state is lacking. In some cases, licensure data pertain to only a portion of the manpower supply. Physician licensure statistics which omit residents, interns, and foreign physicians are an outstanding example. The most comprehensive source for physician data is the AMA directory service.

Although few general statements can be made about manpower data this very brief discussion may serve to remind the reader that some judgments are involved in both the presentation and interpretation of tables. A more complete discussion of data sources and methodology in this and other manpower studies is contained in an early chapter of this study. For a good discussion of available sources, their modes of data collection and reliability, see United States Public Health Service, *Health Manpower: United States, 1965-1967*, Publication No. 1000, Washington, USGPO, 1968.

Tables B-3 and B-4 are based on data from the joint study of the

American Hospital Association and the U.S. Public Health Service, *Manpower Resources in Hospitals - 1966*. Table B-3 presents manpower in full-time equivalents for twenty-three categories of health personnel by region and county. These data were extracted through staff tabulation of the AHA-PHS survey questionnaires. Full-time was considered to be forty hours. The responses were translated accordingly. Because the survey was directed to AHA registered hospitals and because the survey response was incomplete the data describe the manpower supply in a percentage of AHA registered hospitals. For the state the survey response was calculated to represent 83 percent of the average daily census in AHA registered hospitals. Obviously this percentage would vary within the state and no attempt was made to calculate this figure on a regional basis.

Table B-4, also based on staff tabulations of AHA-PHS questionnaires, presents the responses of registered hospitals to survey questions about additional manpower needs. Hospitals were asked to a) record their budgeted vacancies at the end of the reporting week, b) estimate personnel needed to provide optimum care for the current patient load, and c) estimate personnel needed to provide optimum care for estimated patient load one year from the reporting week. Staff recorded the responses to these three questions in two categories designated as budgeted vacancies (BV) and additional needs (AN). The three questions were mutually exclusive and therefore could be added to show the total number of additional personnel required by the institution in one year's time. This total has been calculated and is shown in Table B-4.

There are numerous problems involved in any attempt to survey for manpower needs and additional problems connected with the interpretation of the data thus developed. The difficulties encountered by the three questions on need in this survey include the following:

1. Budgeted vacancies are intimately connected with both financial considerations and appraisals of personnel availability. Budgeted vacancies may therefore be a measure of either or both of these variables as much as reflection of need or manpower shortage.

2. Budgeted vacancies in some occupational categories are an extremely unstable variable.

3. Responses to question B will depend on individual definitions of "optimum care" as well as institutional estimates which are certain to vary with respect to methodology and accuracy.

4. Question C contains the same difficulties as question B and in addition requires that a second estimate be made - that of patient load one year from the survey date.

Additional difficulties could be listed but it should be quite clear that these data need to be interpreted with caution in order to be useful. The data will serve as approximate indicators of the size of shortages in hospital health manpower and will also show the relative positions of the various occupations with respect to needs.

TABLE B-1

Major Provisions of Michigan Licensing Statutes Affecting Health Occupations

Profession or Occupation	Licensing Statute: First enactment	Licensing Statute: Nature of present act[1]	Board Membership: No.	Board Membership: Term Length (years)	Reciprocity or Endorsement	Examination[2]: W	O	P	B	Minimum Prerequisites: Education	Internship	U.S. Citizenship[3]	Age
Chiropractor	1913	C	3	4	X	X[4]	X	X		H.S. grad., 4 yrs. school of chiropractic		X	21
Dentist	1883	C	7	7		X	X	X	X	2 yrs. college, 4 yrs. edn. sch.		XX	21
Dental Hygienists	1919	C	7	7		X	X	X		H.S. grad., 2 yrs. sch. of den. hyg.		XX	
Engineer, Professional	1919	C	7	7	X	X				8 yrs. exp.; may substitute 5 yrs. of eng. sch. for all but 3 yrs. exp.			21
Nurse													
R.N.	1909	C	6	3	X	X				H.S. grad., 2 to 4 yrs. college or hospital program			20
L.P.N.	1952	V	9	3	X	X				1 academic yr. of vocational training			19
Nursing Home Administrator	1969	C	5		X	X				Course of instruction approved by Dept. of Lic. and Reg.[6]			21
Optometrist	1909	C	5	6	X	X	X	X		1 yr. college, 4 yrs. school of optometry			21
Pharmacist	1885	C	5	5	X	X		X		B.S. in Pharmacy (5 yrs.)	12 mos. exp.	XX	21
Physical Therapist	1965	V	7	3	X	X				B.S. in Physical Therapy (4 yrs.)			20
Physician													
M.D.	1899	C	10	4	X	X[4]	X		X	2-4 yrs. college, 4 yrs. med. school	X	XX	21
D.O.	1903	C	5	5	X	X[4]	X		X	3 yrs. college, 4 yrs. osteopathic college	X		21

TABLE B-1 (CONT.)

Profession or Occupation	Licensing Statute: First enactment	Licensing Statute: Nature of present act[1]	Board Membership: No.	Board Membership: Term Length (years)	Reciprocity or Endorsement	Examination[2]: W	O	P	B	Minimum Prerequisites: Education	Internship	U.S. Citizenship[3]	Age
Podiatrist	1915	C	3	6	X	X	X	X		2 yrs. college, 4 yrs. school of podiatry	X	XX	21
Psychologist	1959	V	5	3	X	X	X		X	Ph.D. in psych. from accre. college	1,3, or 5 yrs. exp.	XX	21
Sanitarian	1963	V	5	2	X	X				4 yrs. college, 3 yrs. exp.			
Veterinarian	1907	C	6	5	X	X	X	X		Degree (DVM) from accre. college of vet. med.		XX	21

1/ Compulsory (C)= only persons holding a license are permitted to practice the occupation, and unlicensed persons are prohibited from working in the field. Voluntary (V)= only persons holding a license are authorized to use a particular title or designation; unlicensed persons may work in field but may not use the protected title.
2/ Written (W); oral (O); practical (P); national board examination accepted in lieu of part or all of state requirements(B).
3/ X= full citizenship; XX= full citizenship or legal declaration of intention.
4/ Part of written examination consists of the basic science examination.
5/ Advisory council, not established at time of this report, will be appointed by the Director of the Department of Licensing and Regulation.
6/ No other educational prerequisites explicit in legislation; applicants shall "have such additional qualifications as may be required by the department" [of licensing and regulation].

Sources: U.S. Department of Health, Education, and Welfare, Public Health Service. *State Licensing of Health Occupations.* PHS pub. no. 1758 (Washington, D.C.: USGPO, 1967); Licensing statutes of the State of Michigan for each profession/occupation

TABLE B-2 PART I

HEALTH MANPOWER IN MICHIGAN BY REGION AND COUNTY
Physicians, Nurses and Dental Manpower

Region-County	Physicians M.D. - 1967 Total	Physicians M.D. - 1967 Pat. Care[1]	Physicians D.O. - 1965 Total	Physicians D.O. - 1965 Pat. Care	Nurses RN 1968[2]	Nurses LPN 1968[3]	Dentists 1968 Total	Dentists 1968 Active	Dental Hygienists 1968 Total	Dental Hygienists 1968 Active
HOUGHTON-IRONWOOD										
Baraga	3	3			49	26	2	2		
Gogebic	13	13	1	1	112	89	9	7		
Houghton	24	23			245	73	14	10	1	1
Keewenaw	1				7	5	1	1		
Ontonagon	4	4			57	34	3	2		
Subtotals	45	43	1	1	470	227	29	22	1	1
MARQUETTE-IRON MT.										
Alger	5	4			33	16	2	2		
Dickinson	19	15			165	104	15	13	4	-
Iron	9	8	2	2	56	45	13	11		
Marquette	56	53	1		498	240	31	28	3	-
Subtotals	89	80	3	2	752	405	61	54	7	
ESCANABA										
Delta	26	23	1	1	146	119	17	15		
Menominee	9	9			69	51	6	4		
Schoolcraft	4	4			32	44	4	4		
Subtotals	39	36	1	1	247	214	27	23		
SAULT STE. MARIE										
Chippewa	23	22			178	97	16	13	1	-
Luce	12	11			56	45	4	4		
Mackinac	7	5	5	5	51	22	5	4	2	2
Subtotals	42	38	5	5	285	164	25	21	3	2
TRAVERSE-BAY										
Antrim	6	4	5	5	41	23	4	3		
Benzie	5	5	2	2	32	24	9	7		
Charlevoix	7	6	1	1	96	45	9	9		
Emmet	41	41			136	86	12	11	1	1

TABLE B-2 PART I

Health Manpower in Michigan by Region and County (cont.)

Region-County	Physicians M.D. - 1967 Total	Physicians M.D. - 1967 Pat. Care[1]	Physicians D.O. - 1965 Total	Physicians D.O. - 1965 Pat. Care	Nurses RN 1968[2]	Nurses LPN 1968[3]	Dentists 1968 Total	Dentists 1968 Active	Dental Hygienists 1968 Total	Dental Hygienists 1968 Active
TRAVERSE-BAY (cont.)										
Grand Traverse	92	88	14	13	410	238	31	28	8	3
Kalkaska	3	3			24	9	2	1		
Leelanau	4	4			57	22	4	3		
Manistee	13	12	4	4	110	69	13	12	1	-
Wexford	18	17	5	4	92	94	6	6	1	-
Subtotals	191	182	32	30	1019	619	91	81	11	4
ALPENA										
Alcona	2	1			15	8	2	1		
Alpena	24	23			136	128	14	13	5	4
Cheboygan	10	7	2	2	78	38	3	3		
Crawford	7	5	1		39	29	3	3		
Montmorency					31	14	1	1		
Oscoda	1	1	1	1	16	17	6	6		
Otsego	8	6	1	1	52	23	8	6		
Presque Isle	6	5			44	44	1	-		
Subtotals	58	48	5	4	411	301	38	33	5	4
GRAND RAPIDS-MUSKEGON										
Allegan	33	31	7	7	203	119	37	32	2	1
Ionia	26	25	10	8	170	69	19	18	4	1
Kent	523	501	84	80	2732	1305	236	208	60	36
Lake	2	2	1	1	14	7	5	4		
Mason	18	16	1	1	118	29	13	11	2	1
Mecosta	15	10	7	6	102	44	11	10	8	6
Montcalm	22	22	30	27	156	116	16	14	2	
Muskegon	126	114	47	44	849	331	76	71	11	5
Newaygo	13	12	1	1	108	30	9	8		
Oceana	7	6			92	33	7	6	2	-
Osceola	5	5	2	2	54	43	6	4	1	-
Ottawa	81	75	7	7	622	403	39	33	6	3
Subtotals	871	819	197	184	5220	2529	474	419	98	53

TABLE B-2 PART I

Health Manpower in Michigan by Region and County (cont.)

Region-County	Physicians M.D. - 1967 Total	Pat. Care[1]	D.O. - 1965 Total	Pat. Care	Nurses RN 1968[2]	LPN 1968[3]	Dentists 1968 Total	Active	Dental Hygienists 1968 Total	Active
SAGINAW-BAY										
Arenac	4	4	2	2	34	25	3	3		
Bay	93	92	21	19	622	403	44	39	5	1
Clare	5	5	7	7	53	34	5	4		
Gladwin	3	3	3	2	40	25	3	3		
Gratiot	26	25	11	11	133	108	10	9	7	5
Huron	21	20	6	6	181	49	14	13	1	1
Iosco	10	8			110	42	3	2	1	1
Isabella	32	31	7	6	151	72	13	11	3	2
Midland	73	65	6	6	428	125	37	34	15	10
Ogemaw	10	8	5	2	33	26	7	6		
Roscommon	6	4	4	3	30	14	4	3		
Saginaw	208	196	63	61	1250	468	97	88	39	27
Sanilac	15	15	8	8	135	44	6	5	2	-
Tuscola	22	21	12	10	192	55	10	10		
Subtotals	528	497	155	143	3392	1490	256	230	73	47
LANSING										
Clinton	12	9	7	7	146	85	11	9	2	2
Eaton	21	19	11	11	218	119	20	17	2	1
Ingham	318	269	61	59	1717	648	162	151	61	39
Subtotals	351	297	79	77	2081	852	193	177	65	42
FLINT										
Genesee	454	429	153	146	2121	1284	180	163	49	38
Lapeer	30	26	17	17	207	176	15	14	2	2
Shiawasee	31	29	8	8	274	127	24	22	6	3
Subtotals	515	484	178	171	2602	1587	219	199	57	43
BENTON HARBOR-ST. JOSEPH										
Berrien	123	115	26	24	794	210	78	70	7	5
Cass	14	11	4	3	83	35	12	9	1	1
Van Buren	27	24	3	-	213	110	16	14	5	4
Subtotals	164	150	33	27	1090	355	106	93	13	10

TABLE B-2 PART I

Health Manpower in Michigan by Region and County (cont.)

Region-County	Physicians M.D. - 1967 Total	Pat. Care[1]	D.O. - 1965 Total	Pat. Care	Nurses RN 1968[2]	LPN 1968[3]	Dentists 1968 Total	Active	Dental Hygienists 1968 Total	Active
KALAMAZOO-BATTLE CREEK										
Barry	18	15	4	4	145	69	7	7	2	2
Branch	29	27	5	4	144	96	14	12	2	1
Calhoun	139	125	37	35	871	599	79	67	24	17
Kalamazoo	298	256	15	12	1303	506	121	112	35	18
St. Joseph	28	27	8	8	209	61	17	14	2	1
Subtotals	512	450	69	63	2672	1331	238	212	65	39
JACKSON										
Hillsdale	16	16	4	3	116	82	15	12		
Jackson	122	114	19	17	765	248	70	62	17	12
Lenawee	59	56	6	5	403	200	37	35	11	8
Subtotals	197	186	29	25	1284	530	122	109	28	20
DETROIT										
Livingston	28	24	9	9	222	130	20	17	2	1
Macomb	250	244	140	137	2390	930	249	243	60	40
Monroe	49	45	20	19	310	159	32	31	11	9
Oakland	1174	1103	240	233	4745	1504	567	527	225	135
St. Clair	88	85	10	7	546	220	47	41	8	4
Washtenaw	1123	815	16	14	2373	459	275	261	85	48
Wayne	4427	3964	682	661	11688	5518	1503	1317	373	250
Subtotals	6939	6280	1117	1080	22274	8820	2693	2437	764	487
STATE TOTALS	10541	9590	1904	1813	43799	19424	4572	4110	1190	752

1/ Includes physicians in private practice, interns, residents, and full-time hospital staff.
2/ Figures on active nurses are not available. Based on past trends and calculations, an estimated 62.5 percent or about 27400 of the total licensees are active.
3/ Figures on active LPN's are not available. Based on past trends and calculations an estimated 74 percent or about 14400 of the total licensees are active.

Sources: *Distribution of Physicians, Hospitals and Hospital Beds in the U.S., 1967,* AMA, 1968; *A Statistical Study of the Osteopathic Profession,* Dec. 31, 1965, A.O.A., 1966; Michigan Board of Nursing; *Directory of the American Dental Association 1969,* A.D.A., 1969; Michigan State Board of Dentistry.

TABLE B-2 PART II

HEALTH MANPOWER IN MICHIGAN BY REGION AND COUNTY

Rehabilitation Personnel: Physical Therapists (PT), Occupational Therapists (OT), Certified Occupational Therapy Assistant (OTA), Rehabilitation Counselor (Rehab.), Certified Orthotist & Prosthetist (Orth. & Pros.), Orthoptist (Orthop.), Corrective Therapists (Corr. Ther.), Educational Therapists (Ed. Ther.), Manual Arts Therapists (Man. Ther.), Music Therapists (Mus. Ther.).

Region-County	PT 1968	OT 1968	OTA 1968	Rehab. 1968	Orth.&Pros. 1967	Orthop. 1966	Corr. Ther. 1968	Ed. Ther. 1968	Man. Ther. 1968	Mus. Ther. 1966
HOUGHTON-IRONWOOD										
Gogebic	1									
Houghton	1									
Subtotals	2									
MARQUETTE-IRON MT.										
Alger	1									
Dickinson	2	1					1			
Marquette	3	2		6	1					
Subtotals	6	3		6	1		1			
ESCANABA										
Delta	2									
Subtotals	2									
SAULT STE. MARIE										
Chippewa	2	3								
Luce		1	2							
Subtotals	2	4(1)	2							
TRAVERSE-BAY										
Antrim										
Benzie	2	1								
Charlevoix	1									
Emmet	1									
Grand Traverse	4	9		3						
Kalkaska		2								
Leelanau										
Manistee	1									
Wexford		1								
Subtotals	9	13(3)		3						

TABLE B-2 PART II

Health Manpower in Michigan by Region and County (cont.)
Rehabilitation Personnel

Region-County	PT 1968	OT 1968	OTA 1968	Rehab. 1968	Orth.&Pros. 1967	Orthop. 1966	Corr. Ther. 1968	Ed. Ther. 1968	Man. Ther. 1968	Mus. Ther. 1966
ALPENA										
Alpena	2			3						
Subtotals	2			3						
GRAND RAPIDS-MUSKEGON										
Allegan	2	12	1							
Ionia	1	1								2
Kent	28	10	1	8	6	1				
Mecosta		2								
Montcalm	2	1								1
Muskegon	8	7		5	1					
Oceana	1									
Ottawa	5	2								
Subtotals	47	35(6)	2	13	7	1				3
SAGINAW-BAY										
Bay	5	4								
Gratiot	1	1								
Huron		1								
Iosco	2									
Isabella	3			4						
Midland	2	3								
Saginaw	13	5		8	1		1			
Sanilac	1									
Tuscola		1								
Subtotals	27	15(4)		12	1		1			
LANSING										
Clinton		2								
Eaton	4									
Ingham	27	23		7	1					3
Subtotals	31	25(3)		7	1					3

153

TABLE B-2 PART II

Health Manpower in Michigan by Region and County (cont.)
Rehabilitation Personnel

Region-County	PT 1968	OT 1968	OTA 1968	Rehab. 1968	Orth.&Pros. 1967	Orthop. 1966	Corr. Ther. 1968	Ed. Ther. 1968	Man. Ther. 1968	Mus. Ther. 1966
FLINT										
Genesee	21	15		13	1					
Lapeer	2									
Shiawasee	3									
Subtotals	26	15(6)		13	1					
BENTON HARBOR-ST. JOSEPH										
Berrien	8			6						
Cass										
Van Buren	1	1	1			1				
Subtotals	9	1	1	6		1				
KALAMAZOO-BATTLE CREEK										
Barry	2	2								
Branch	2	1								
Calhoun	19	18			4		8	8	10	1
Kalamazoo	17	39	7	7	2					3
St. Joseph		2								
Subtotals	40	62(2)	7	7	6		8	8	10	4
JACKSON										
Hillsdale	1	1								
Jackson	6	2		10	2					
Lenawee	3	3				1				
Subtotals	10	6		10	2	1				
DETROIT										
Livingston	1	3								
Macomb	15	20		9						1
Monroe	5	6	1							
Oakland	58	67	4	21	6	3				6
St. Clair	4	1								
Washtenaw	48	75	1	12	5	1				1
Wayne	89	131	9	67	18	7	1	1		2
Subtotals	220	250(53)	15	109	29	11	1	1	10	

TABLE B-2 PART II

Health Manpower in Michigan by Region and County (cont.)
Rehabilitation Personnel

Region-County	PT 1968	OT 1968	OTA 1968	Rehab. 1968	Orth.&Pros. 1967	Orthop. 1966	Corr. Ther. 1968	Ed. Ther. 1968	Man. Ther. 1968	Mus. Ther. 1966
STATE TOTALS	433	482(78)2/	27	1893/	48	14	11*	9*	10*	20

1/ The Michigan Occupational Therapy Association estimates there are about 200 registered occupational therapists in the state who are not included in these totals, virtually all of whom are inactive.
2/ Figures in parentheses identify a portion of the total personnel which includes both trained therapists who are not registered with the AOTA or whose registration is in process and persons who lack sufficient preparation but have been employed as occupational therapists for a number of years.
3/ An additional 15 are estimated to be working as "professional case-carrying counselors in sheltered workshops" aside from those listed by the D.V.R. regional offices. (Personal communication from Paul Wright of D.V.R., 5/10/68).

*Employed in V.A. hospitals.

Sources: The Michigan Board of Physical Therapists; The Michigan Occupational Therapy Association, current mailing list; Michigan Department of Education, Vocational Rehabilitation Division; 1967 Registry of Certified Facilities and Individuals in Orthotics and Prosthetics; The American Orthoptic Council; Michigan Veterans Administration Hospitals; Membership List, National Association for Music Therapy, Inc., Lawrence, Kansas.

TABLE B-2 PART III

HEALTH MANPOWER IN MICHIGAN BY REGION AND COUNTY

Region-County	Speech & Hearing 1968[1]	Dietitians 1967[2]	Nutritionists 1967	Med. Rec. Librarians 1966[3]	Med. Rec. Technicians 1966[4]	Medical Librarians 1966[5]	Pharmacist 1968	Psychologist in Health Setting 1965
HOUGHTON-IRONWOOD								
Baraga							5	
Gogebic	2	1			1		12	
Houghton	2	3		1			19	
Keewenaw							1	
Ontonagon							2	
Subtotals	4	4		1	1		39	
MARQUETTE-IRON MT.								
Alger		1					4	
Dickinson		2		1			11	
Iron							6	
Marquette	10	2		1		1	28	1
Subtotals	10	5		2		1	49	1
ESCANABA								
Delta	1	2		1			25	1
Menominee		1					6	
Schoolcraft							7	
Subtotals	1	3		1			38	1
SAULT STE. MARIE								
Chippewa	2	1			1		12	
Luce		1					7	
Mackinac							6	
Subtotals	2	2			1		25	
TRAVERSE-BAY								
Antrim							8	
Benzie							10	
Charlevoix	3						11	1
Emmet		1					19	1

TABLE B-2 PART III

Health Manpower in Michigan by Region and County (cont.)

Region-County	Speech & Hearing 1968[1]	Dietitians 1967[2]	Nutritionists 1967	Med. Rec. Librarians 1966[3]	Med. Rec. Technicians 1966[4]	Medical Librarians 1966[5]	Pharmacist 1968	Psychologist in Health Setting 1965
TRAVERSE-BAY (CONT.)								
Grand Traverse	8	2					42	3
Kalkaska							7	
Leelanau							7	
Manistee							17	
Missaukee							4	
Wexford							14	
Subtotals	11	3					139	5
ALPENA								
Alcona		1					5	
Alpena					1		13	1
Cheboygan	3				1		13	
Crawford				1			4	
Montmorency							9	
Oscoda	2						3	
Otsego							10	
Presque Isle							8	
Subtotals	5	1		1	2		65	1
GRAND RAPIDS-MUSKEGON								
Allegan	5	1		1			26	1
Ionia				1			27	2
Kent	36	17	1	5		2	310	10
Lake	1						1	
Mason	3						17	
Mecosta	3	2					20	
Montcalm	4	1		1			26	2
Muskegon	7	3		1		1	87	4
Newaygo	3		2				12	
Oceana							9	
Osceola							8	
Ottawa	7	1		1	1		57	1
Subtotals	69	25	3	10	1	3	600	20

TABLE B-2 PART III

Health Manpower in Michigan by Region and County (cont.)

Region-County	Speech & Hearing 1968[1]	Dietitians 1967[2]	Nutritionists 1967	Med. Rec. Librarians 1966[3]	Med. Rec. Technicians 1966[4]	Medical Librarians 1966[5]	Pharmacist 1968	Psychologist in Health Setting 1965
SAGINAW-BAY								
Arenac							4	
Bay	9	1		1			76	
Clare					1		16	
Gladwin							10	
Gratiot	1	1					16	
Huron							16	
Iosco	3	2					14	
Isabella	9	4		1			21	2
Midland	4	5		2			32	
Ogemaw				1			8	
Roscommon							13	
Saginaw	18	7		3	2	1	140	2
Sanilac	1	1					19	
Tuscola	4			1			27	
Subtotals	49	21		9	3	1	412	4
LANSING								
Clinton		2					11	
Eaton	1			1			28	1
Ingham	43	44	7	3	1	3	168	10
Subtotals	44	46	7	4	1	3	207	11
FLINT								
Genesee	31	24		4	4	2	264	4
Lapeer				1			23	
Shiawasee	4	2					31	3
Subtotals	35	26		5	4	2	318	7
BENTON HARBOR-ST. JOSEPH								
Berrien	8	5		1			101	3
Cass	3						10	
Van Buren	1	1		1			26	
Subtotals	12	6		2			137	3

TABLE B-2 PART III

Health Manpower in Michigan by Region and County (cont.)

Region-County	Speech & Hearing 1968[1]	Dietitians 1967[2]	Nutritionists 1967	Med. Rec. Librarians 1966[3]	Med. Rec. Technicians 1966[4]	Medical Librarians 1966[5]	Pharmacist 1968	Psychologist in Health Setting 1965
KALAMAZOO-BATTLE CREEK								
Barry	1	1					18	
Branch	3	1					21	1
Calhoun	7	10	2	4			87	11
Kalamazoo	28	11		3	1	4	136	9
St. Joseph	1	3		1			14	
Subtotals	40	26	2	8	1	4	276	21
JACKSON								
Hillsdale	1	3		1			11	1
Jackson	2	6		2			74	5
Lenawee	6	4		1			42	4
Subtotals	9	13		4			127	10
DETROIT								
Livingston	3						29	
Macomb	13	14		3		1	256	11
Monroe	4	3		1	1		35	4
Oakland	92	47	3	15	1	3	837	52
St. Clair	6	1	2	2			68	3
Washtenaw	35	41	7	9	1	7	172	29
Wayne	143	146	12	52	12	24	1474	123
Subtotals	296	252	24	82	15	35	2871	222
STATE TOTALS	587	433	36	129	29	49	5303	306

1/ Total consists of 21 audiologists and 566 speech pathologists, approximately two-thirds of whom are employed in school settings.
2/ A.D.A. certified dietitians in health settings.
3/ Registered M.R.L.'s represent between 45 and 50 percent of persons functioning in this job classification in Michigan hospitals (300-plus). Active membership in the AAMRL in Michigan totaled 181 in 1968--140 RRL's and 41 ART's.
4/ Registered M.R.T.'s represent only 6-7 percent of total persons functioning in this job classification in Michigan hospitals (600-plus).

TABLE B-2 PART III

Health Manpower in Michigan by Region and County (cont.)

5/ Based on individual memberships in Medical Library Association plus non-members employed as chief librarians in libraries holding MLA institutional membership. Total includes 10 to 15 individuals who will not have had graduate preparation in library science and/or courses in medical library sciences.

Sources: *Journal of the Michigan Speech and Hearing Association,* Vol. 4, No. 1, 1968; Membership List, American Dietetic Association; Registry, American Association of Medical Record Librarians; *Directory of the Medical Library Association, 1966;* Michigan State Board of Pharmacy; *1966 Directory, American Psychological Association,* A.P.A.. 1967.

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TABLE B-2 PART IV

HEALTH MANPOWER IN MICHIGAN BY REGION AND COUNTY

Region-County	Industrial Hygienists 1968	Health Physicists 1967	Sanitarians 1968 [1/]	Sanitary Engineer 1962	Podiatrist 1967	Veterinarian 1968	Optometrist 1968	Chiropractor 1966
HOUGHTON-IRONWOOD								
Baraga								4
Gogebic			4		2	1	1	4
Houghton			2	4		3	4	3
Keewenaw			1					
Subtotals			7(1)	4	2	4	5	11
MARQUETTE-IRON MT.								
Alger							1	
Dickinson					1	2	4	5
Iron							2	2
Marquette	1		2	1	2	2	4	2
Subtotals	1		2(1)	1	3	4	11	9
ESCANABA								
Delta				3	1	6	5	5
Menominee			1		1	3		1
Schoolcraft			1				2	
Subtotals			2(1)	3	2	9	7	6
SAULT STE. MARIE								
Chippewa			2		1	2	1	2
Luce			1					2
Subtotals			3		1	2	1	4
TRAVERSE-BAY								
Benzie					1		1	2
Charlevoix		2	2			1	1	4
Emmet					1	7	3	3
Grand Traverse			2	2	2	9	4	3
Leelanau				1				
Manistee			1		1	2	2	4
Missaukee			1					
Wexford			2	1	2	2	4	3
Subtotals		2	8(4)	4	7	21	15	19

TABLE B-2 PART IV

Health Manpower in Michigan by Region and County (cont.)

Region-County	Industrial Hygienists 1968	Health Physicists 1967	Sanitarians 1968[17]	Sanitary Engineer 1962	Podiatrist 1967	Veterinarian 1968	Optometrist 1968	Chiropractor 1966
ALPENA								
Alcona						1		
Alpena			1	1	1	1	4	5
Cheboygan				1		1	2	3
Crawford				1			1	5
Oscoda						1		
Otsego						3	1	2
Presque Isle			3			2	1	
Subtotals			4(3)	3	1	9	9	15
GRAND RAPIDS-MUSKEGON								
Allegan			3			10	6	5
Ionia			1			8	5	5
Kent	3		12	13	15	35	42	57
Lake							1	
Mason			1		1	2	2	4
Mecosta			1		1	4	3	4
Montcalm			1			4	3	4
Muskegon		1	6	5	5	9	10	9
Newaygo			2			6	2	2
Oceana						1	2	4
Osceola			1			2	1	4
Ottawa			4		2	13	11	16
Subtotals	3	1	32(12)	18	24	94	88	114
SAGINAW-BAY								
Arenac			1			1	1	1
Bay			6	3	4	7	9	8
Clare						2	2	
Gladwin						2	1	1
Gratiot	1		1	1	1	4	8	4
Huron						5	5	3
Iosco					1	1	2	4
Isabella			1		1	3	1	3

TABLE B-2 PART IV

Health Manpower in Michigan by Region and County (cont.)

Region-County	Industrial Hygienists 1968	Health Physicists 1967	Sanitarians 1968[1/]	Sanitary Engineer 1962	Podiatrist 1967	Veterinarian 1968	Optometrist 1968	Chiropractor 1966
SAGINAW-BAY (CONT.)								
Midland	12	1(cert.)	3	8	2	8	4	4
Ogemaw			2			2	2	5
Roscommon			1		1	1	1	2
Saginaw	1		9	5	6	20	14	10
Sanilac			1			13	3	3
Tuscola						6	5	3
Subtotals	14	1	25(13)	17	16	75	58	51
LANSING								
Clinton				1		9	3	5
Eaton			4		1	14	9	4
Ingham	8	3	9	38	9	93	29	21
Subtotals	1		29(15)	2	12	48	48	36
BENTON HARBOR-ST. JOSEPH								
Berrien			7	2	4	16	15	13
Cass	1			1		4	2	5
Van Buren	1		2	1	1	5	2	5
Subtotals	2		9(2)	4	5	25	19	23
KALAMAZOO-BATTLE CREEK								
Barry			3		1	7	4	2
Branch			2	1	1	6	3	6
Calhoun	1	1(cert.)	7	3	5	16	14	20
Kalamazoo	2	1	8	6	6	28	16	16
St. Joseph			2		4	6	6	9
Subtotals	3	2	22(11)	10	17	63	43	53

TABLE B-2 PART IV

Health Manpower in Michigan by Region and County (cont.)

Region-County	Industrial Hygienists 1968	Health Physicists 1967	Sanitarians 1968[1/]	Sanitary Engineer 1962	Podiatrist 1967	Veterinarian 1968	Optometrist 1968	Chiropractor 1966
JACKSON								
Hillsdale			2		1	10	5	4
Jackson		2	6		4	13	9	10
Lenawee		1	4		2	12	7	4
Subtotals		3	12(3)		7	35	21	18
DETROIT								
Livingston		1	2		1	10	7	5
Macomb	18	1(cert.)	17	4	19	30	49	35
Monroe		3	6		3	7	5	11
Oakland	13	1	27	15	25	96	101	45
St. Clair	1		4		2	9	6	14
Washtenaw	32	16(4 cert.)	9	37	4	21	11	5
Wayne	94	4	149	57	106	131	235	227
Subtotals	157	26	214(85)	113	160	304	414	342
STATE TOTALS	190	38 (7 cert.)	382(158)	218	267	809	780	731

1/ Number registered as required by law for certain positions is given in parentheses in the regional subtotals and the state totals.

Sources: Membership lists: American Industrial Hygienists Association; American Conference of Governmental Industrial Hygienists; Michigan Industrial Hygienists Society; Health Physics Society, 1967-1968. The Michigan Department of Licensure and Regulation Board of Chiropractic Examiners; Board of Optometry; Board of Podiatry; Board of Veterinary Examiners. Also, Pennell, M. Y. and Baker, K. I., *Location of Manpower in 8 Health Occupations, Health Manpower Source Book 19*, U.S. Dept. of Health, Education, and Welfare, Public Health Service, Washington, GPO, 1965.

TABLE B-3 PART I

MANPOWER RESOURCES IN MICHIGAN HOSPITALS IN FULL-TIME EQUIVALENTS BY REGION AND COUNTY, 1966

Region-County	Reg. Nurse	Lic. Pract. Nurse	Med. Tech.	Lab. Asst.	Cyto-tech.	Histol. Tech.	Occup. Ther.	Occup. Ther. Asst.	Phys. Ther.	Phys. Ther. Asst.	Recr. Ther.	Inhal. Ther.
HOUGHTON-IRONWOOD												
Baraga	16	10	2	1								
Gogebic	12	17	1	4						1		
Houghton	24	17	3	1								
Ontonagon	7	4	1									
Subtotals	59	48	7(5)[1]	6						1		
MARQUETTE-IRON MT.												
Alger	5	4	1						1			
Dickinson	81	46	7	5			1		2	2	1	
Iron	10	6	1									
Marquette	125	41	19			2	2		5	2		
Subtotals	221	97	28(7)	5(5)		2	3(3)		8(7)	4	1	
ESCANABA												
Delta	30	25	5			1			1	1		
Menominee	26	15	2						1	1		
Schoolcraft	39	43	2									
Subtotals	95	83	9(1)			1			2(2)	2		
SAULT STE. MARIE												
Chippewa	72	35	13			2	3		2	2		
Luce	28	38	5	3			2	4			23	
Subtotals	100	73	18(4)	3(1)		2	5(4)	4	2(2)	2	23	
TRAVERSE-BAY												
Benzie												
Charlevoix	13	3	1	1						1		
Emmet	14	9	1	1						2		
Grand Traverse	157	97	20	6	1	3	6		7	6	8	
Kalkaska	3	1										
Leelanau	5	3	2									
Manistee	13	12	4						1	1		

TABLE B-3 PART I

Manpower Resources in Michigan Hospitals in Full-Time Equivalents by Region and County, 1966 (cont.)

Region-County	Reg. Nurse	Lic. Pract. Nurse	Med. Tech.	Lab. Asst.	Cyto-tech.	Histol. Tech.	Occup. Ther.	Occup. Ther. Asst.	Phys. Ther.	Phys. Ther. Asst.	Recr. Ther.	Inhal. Ther.
TRAVERSE-BAY (CON.)												
Wexford	30	44	4	2		1				2		
Subtotals	235	169	32(13)	10(3)	1(1)	4(1)	6(5)		8(3)	12	8	-
ALPENA												
Crawford	13	17	3						2			
Otsego	16	8	3									
Presque Isle	20	15	4	1					1			
Subtotals	49	40	10(2)	1					3(1)			
GRAND RAPIDS-MUSKEGON												
Allegan	43	31	2	1			12	1	1	2		
Ionia	27	2	2	1			1					
Kent	345	338	53	18	1	1	10	1	7	8	2	3
Mason	26	7		4								
Mecosta	27	13	2	1			2					
Montcalm	19	9	14	7			1		1	2		
Muskegon	183	71	21		1	2	7		5	5		1
Newaygo	4	1	1	3								
Oceana	13	5	3									
Osceola	8	5	1									
Ottawa	54	52	7			2	2		1			
Subtotals	749	534	106(64)	35(2)	2(1)	5(5)	35(29)	2	15(14)	17	2	4
SAGINAW-BAY												
Bay	99	64	4	2			4		1	3		4
Gratiot	5	7		1			1		1	2		
Huron	6	2	1				1					
Iosco	41	10	3	5						1		
Isabella	46	21	12	4		1			1		3	2
Midland	87	35	11	12		2	3		1	1		
Ogemaw	11	13	2									1
Saginaw	342	146	55	19	1	4	5		8	13	2	9

TABLE B-3 PART I

Manpower Resources in Michigan Hospitals in Full-Time Equivalents by Region and County, 1966 (cont.)

Region-County	Reg. Nurse	Lic. Pract. Nurse	Med. Tech.	Lab. Asst.	Cyto-tech.	Histol. Tech.	Occup. Ther.	Occup. Ther. Asst.	Phys. Ther.	Phys. Ther. Asst.	Recr. Ther.	Inhal. Ther.
SAGINAW-BAY (CONT.)												
Sanilac	14	9	3						1	1		
Tuscola	27	4	1	3			1				1	
Subtotals	678	311	92(50)	47	1(1)	7(3)	15(11)		13(11)	21	6	16(6)
LANSING												
Clinton	25	7	2	2			2					
Eaton	21	11	2	2								
Ingham	354	209	72	12	3	4	23		5	3		27
Subtotals	400	227	76(49)	16	3(2)	4(2)	25(22)		5(5)	3		27(4)
FLINT												
Genesee	280	284	39	21		5	15		10	11	1	4
Lapeer	39	55	5	3					2	5	8	
Shiawasee	65	31	6	4		1			1	3		
Subtotals	384	370	50(40)	28(2)		6(1)	15(9)		13(13)	19	9	4
BENTON HARBOR-ST. JOSEPH												
Berrien	82	23	10	2		1			3	5		2
Cass	12	2	2	1								
Van Buren	35	21	5		1	1	1	1		1		
Subtotals	129	46	17(9)	3(1)	1(1)	2(1)	1(1)	1	3(2)	6		2(1)
KALAMAZOO-BATTLE CREEK												
Barry	34	11	5				2		1	1		1
Branch	23	16	2				2		1	2	13	
Calhoun	189	153	18	7		2	18		3	12	14	
Kalamazoo	239	152	43	13		4	48	12	9	6		10
St. Joseph	60	6	6	5	1		2					
Subtotals	545	338	74(47)	25(3)	1(1)	6(3)	72(70)	12	14(13)	21	27	11(1)

TABLE B-3 PART I

Manpower Resources in Michigan Hospitals in Full-Time Equivalents by Region and County, 1966 (cont.)

Region-County	Reg. Nurse	Lic. Pract. Nurse	Med. Tech.	Lab. Asst.	Cyto-tech.	Histol. Tech.	Occup. Ther.	Occup. Ther. Asst.	Phys. Ther.	Phys. Ther. Asst.	Recr. Ther.	Inhal. Ther.
JACKSON												
Hillsdale	20	22	4	1								
Jackson	134	65	22	26	1	4	2		3	9		3
Lenawee	82	62	12	5	1		3		2	2		
Subtotals	236	149	38(14)	32(4)	2(2)	4(2)	6(6)		5(5)	11		3
DETROIT												
Livingston	38	52		3			3		2	3	3	
Macomb	150	84	27	16			20		7	4	1	3
Monroe	60	48	8	3			6	1	2	3		
Oakland	453	355	89	15	2	11	77	8	16	12	17	5
St. Clair	153	86	11	4			1		4	4		
Washtenaw	767	206	141	54	5	27	79	1	26	20	29	19
Wayne	3214	1745	666	223	11	44	144	9	66	54	20	57
Subtotals	4835	2576	942(524)	318(47)	18(18)	82(47)	330(227)	19	123(105)	100	70	84(16)
STATE TOTALS	8715	5061	1499 (830)	529(68)	29(27)	125 (65)	513(437)	38	214 (183)	219	146	151(28)

1/ Figures in parentheses throughout the table identify that portion of the total personnel who are certified by their respective professional associations.

TABLE B-3 PART II

MANPOWER RESOURCES IN MICHIGAN HOSPITALS IN FULL-TIME EQUIVALENTS BY REGION AND COUNTY, 1966

Region-County	X-Ray Tech.	X-Ray Asst.	EKG Tech.	EEG Tech.	Surg. Tech.	Med. Rec. Lib.	Med. Rec. Tech.	Social Worker	Social Work Asst.	Pharm.	Pharm. Asst.
HOUGHTON-IRONWOOD											
Baraga	2				2	1					
Gogebic	3	2				1					
Houghton	2				2		1				
Ontonagon	1				1	1				1	1
Subtotals	8(3)[1]	2			5	3(1)	1(1)			1	1
MARQUETTE-IRON MT.											
Alger	1										
Dickinson	6	1	1		1	1	2	1		2	1
Iron	1										
Marquette	11	1			14	4	11			2	3
Subtotals	19(10)	2	1		15	6(1)	13	1		4	4
ESCANABA											
Delta	6				6	2	1			2	1
Menominee		1		3	2	1					1
Schoolcraft	1	1				1					
Subtotals	7(6)	2		3	8	4	1			2	2
SAULT STE. MARIE											
Chippewa	6	1			8		11	1		1	4
Luce	3				2			13	1	3	
Subtotals	9(4)	1			10		11(1)	14	1	4	4
TRAVERSE-BAY											
Charlevoix	2		2								1
Emmet	2						3				
Grand Traverse	8	3	2	2	7		9	12	3	5	3
Kalkaska		1				1					
Leelanau	1						1				
Manistee	2		1		1	1	2				
Wexford	3	1					3			1	1
Subtotals	17(13)	5	5	2	8	2	18(9)	12	3	7	5

TABLE B-3 PART II

Manpower Resources in Michigan Hospitals in Full-Time Equivalents by Region and County, 1966 (cont.)

Region-County	X-Ray Tech.	X-Ray Asst.	EKG Tech.	EEG Tech.	Surg. Tech.	Med. Rec. Lib.	Med. Rec. Tech.	Social Worker	Social Work Asst.	Pharm.	Pharm. Asst.
ALPENA											
Crawford	3					1				1	
Otsego	2				1			1		1	
Presque Isle	2		1		1	1	2			1	
Subtotals	7(4)		1		2	2(1)	2	1		3	
GRAND RAPIDS											
Allegan	5	1			1	2	1	1		1	
Ionia	2	1				1				1	
Kent	22	6	2	1	30	3	6	10	3	15	3
Mason	5					1	3			1	1
Mecosta	2					1				1	
Montcalm	2				1	1	1				
Muskegon	22	15	3	2	25	3	6			3	4
Newaygo	1					1					
Oceana	2				1		1				
Osceola	2									1	
Ottawa		2	1	5	3	1	5			3	1
Subtotals	65(54)	25	6	8	61	14(6)	23	11	3	26	9
SAGINAW-BAY											
Bay	7	2			3	2	2			2	
Huron	2					2				1	
Iosco	3	5			5		7			1	3
Isabella	5	1	1		3	1	3	5		4	1
Midland	6	2	2		7	1	11		1	1	1
Ogemaw	2		1		1	1	1			1	
Saginaw	24	9	8	3	20	3	17	3	2	9	6
Sanilac	1				3	1	1				
Tuscola	5	2	2	6	2	1		5	1	1	
Subtotals	55(41)	21	14	9	44	12(7)	42	13	4	20	11

TABLE B-3 PART II

Manpower Resources in Michigan Hospitals in Full-Time Equivalents by Region and County, 1966 (cont.)

Region-County	X-Ray Tech.	X-Ray Asst.	EKG Tech.	EEG Tech.	Surg. Tech.	Med. Rec. Lib.	Med. Rec. Tech.	Social Worker	Social Work Asst.	Pharm.	Pharm. Asst.
LANSING											
Clinton	2					3					
Eaton	2				4	1	3			1	
Ingham	34	10		2	18	3	26	7	1	16	7
Subtotals	38(35)	10		2	22	7(2)	29	7	1	17	7
FLINT											
Genesee	22	7	6		10	4	15	3		8	5
Lapeer	5	1	4			4		10	3	2	
Shiawasee	5	2			2	2				1	2
Subtotals	32(29)	10	10		12	10(4)	15	13	3	11	7
BENTON HARBOR-ST. JOSEPH											
Berrien	6	1	1		5	3	8		1	2	2
Cass	1				1	1	1				
Van Buren	6	1	2		5	2	1			1	
Subtotals	13(13)	2	3		11	6(2)	10		1	3	2
KALAMAZOO-BATTLE CREEK											
Barry	3		1		3	3				1	
Branch	1							11		1	1
Calhoun	18	2	5	1	2	4	9	14		6	4
Kalamazoo	19		6	3	22	3		8		10	7
St. Joseph	6	4	1		2	1	1				1
Subtotals	47(36)	6	13	4	29	11(3)	10(1)	33		18	13
JACKSON											
Hillsdale	3	2	1			3				1	
Jackson	12	3	3	1	1	2	8	3	1	3	1
Lenawee	7	2			6	2	4			3	
Subtotals	22(17)	7	4	1	7	7(3)	12	3	1	7	1

TABLE B-3 PART II

Manpower Resources in Michigan Hospitals in Full-Time Equivalents by Region and County, 1966 (cont.)

Region-County	X-Ray Tech.	X-Ray Asst.	EKG Tech.	EEG Tech.	Surg. Tech.	Med. Rec. Lib.	Med. Rec. Tech.	Social Worker	Social Work Asst.	Pharm.	Pharm. Asst.
DETROIT											
Livingston	2	1	2		1	1	3	2		2	1
Macomb	15	7	11	4	15	3	12	1	1	7	6
Monroe	7	2	1			2	9	1		3	2
Oakland	46	8	9	2	28	6	9	32	2	27	8
St. Clair	9		3		8	5	4			3	3
Washtenaw	58	21	9	7	74	9	8	93		40	21
Wayne	266	96	67	32	227	68	75	131	11	154	29
Subtotals	403 (329)	135	102	45	353	94 (58)	120(7)	260	14	236	70
STATE TOTALS	742 (594)	228	159	74	587	178 (89)	307	368	31	359	136

1/ Figures in parentheses throughout the table identify that portion of the total personnel who are certified by their respective professional associations.

1/2

TABLE B-4

Manpower Resources and Needs in Michigan Hospitals, State Totals, 1966[1/]

Occupation	Supply Total (Est. Headcount)[2/]	Supply[3/] FTE	Additional Needs BV	AN	Total
Reg. Nurse	13526	8715	1536	1880	3416
L.P.N.	6905	5061	832	1241	2073
Med. Tech.	2104	1499	238	290	528
Lab. Asst.	707	529	60	86	146
Cytotech.	56	29	14	28	42
Histol. Tech.	172	125	10	20	30
Occup. Ther.	325	513	43	149	192
O.T.A.	81	38	11	70	81
Phys. Ther.	285	214	54	92	146
P.T.A.	276	219	20	72	92
Recreat. Ther.	194	146	18	131	149
Inhal. Ther.	195	151	39	101	140
X-Ray Tech.	917	742	112	146	258
X-Ray Asst.	298	228	26	37	63
E.K.G. Tech.	264	159	16	35	51
E.E.G. Tech.	---	74	4	20	24
Surg. Tech.	764	587	71	138	209
Med. Rec. Lib.	235	178	32	50	82
Med. Rec. Tech.	414	307	19	50	69
Soc. Wker.	506	368	74	235	309
S. W. Asst.	49	31	3	14	17
Pharmacist	508	359	42	90	132
Pharm. Asst.	196	136	10	42	52

Number of reporting hospitals: 193
Number of reporting beds: 60,612

1/ Unless otherwise noted, tables B-4 contain data only on reporting hospitals in the AHA-PHS survey; a sample representing 83 percent of the average daily census of registered hospitals in Michigan.
2/ Headcount estimates made by the AHA and USPHS based on sample representing 83 percent of the average daily census in AHA registered hospitals in Michigan.
3/ Total in FTE based on staff tabulation of AHA-PHS questionnaires and differs from the full-time, part-time, and headcount totals for reporting hospitals contained in the published survey, *Manpower Resources in Hospitals-1966*.

TABLE B-4 (CONT.)

Manpower Resources and Needs in Michigan Hospitals, by Region, 1966

Occupation	Houghton-Ironwood Region				Marquette-Iron Mt. Region				Escanaba Region			
	Supply	Additional Needs			Supply	Additional Needs			Supply	Additional Needs		
	FTE	BV	AN	Total	FTE	BV	AN	Total	FTE	BV	AN	Total
Reg. Nurse	59	8	45	53	221	19	9	28	95	16	26	42
L.P.N.	48	4	26	30	97	19	4	23	83	9	5	14
Med. Tech.	7				28	1	1	2	9	6	5	11
Lab. Asst.	6	-	5	5	5					1	2	3
Cytotech.							1	1			1	1
Hist. Tech.					2				1		1	1
Occup. Ther.					3		3	3				
O.T.A.												
Phys. Ther.		2		2	8				2		2	2
P.T.A.	1		1	1	4		2	2	2			
Rec. Ther.			2	2	1							
Inhal. Ther.			1	1			3	3		1	2	3
X-Ray Tech.	8	1	2	3	19		1	1	7		1	1
X-Ray Asst.	2				2				2			
EKG Tech.					1						1	1
EEG Tech.									3			
Surg. Tech.	5				15	2	3	5	8	1	2	3
Med. R. Lib.	3	1	1	2	6	1	1	2	4	1	1	2
Med. R. Tech.	1				13	1	3	4	1		2	2
Soc. Wker.			2	2		1	2	3				
S. W. Asst.			1	1			2	2				
Pharm.	1		1	1	4				2	1	2	3
Pharm. Asst.	1		3	3	4				2			
Number of reporting hospitals:	6				N = 7				N = 3			
Number of reporting beds:	420				Beds = 825				Beds = 330			

TABLE B-4 (CONT.)

Manpower Resources and Needs in Michigan Hospitals, by Region, 1966

Occupation	Sault Ste. Marie Region				Traverse-Bay Region				Alpena Region				Grand Rapids-Muskegon			
	Supply	Additional Needs			Supply	Additional Needs			Supply	Additional Needs			Supply	Additional Needs		
	FTE	BV	AN	Total	FTE	BV	AN	Total	FTE	BV	AN	Total	FTE	BV	AN	Total
Reg. Nurse	100	27	23	50	235	30	58	88	49	11	17	28	749	80	46	126
L.P.N.	73	14	17	31	169	39	54	93	40	5	16	21	534	55	63	118
Med. Tech.	18	10	5	15	32	7	13	20	10	1	2	3	106	22	9	31
Lab. Asst.	3	4	2	6	10	2	5	7	1	1		1	35	5	4	9
Cytotech.					1		2	2					2		2	2
Histol. Tech.	2				4		1	1					5		1	1
Occup. Ther.	5	1		1	6	2	13	15		1	2	3	35	2	3	5
O.T.A.	4										1	1	2	1		1
Phys. Ther.	2				8	4	5	9	3	3	1	4	15	3	6	9
P.T.A.	2				12	1	3	4		3	4	7	17	1	2	3
Recreat. Ther.	23	1		1	8		7	7			1	1	2	1	1	2
Inhal. Ther.		1		1		1	5	6		1		1	4	4	4	8
X-Ray Tech.	9	4	2	6	17	2	6	8	7	1	4	5	65	3	8	11
X-Ray Asst.	1				5	1	3	4			1	1	25		1	1
EKG Tech.					5	1	1	2	1		1	1	6	1		1
EEG Tech.					2						1	1	8			
Surg. Tech.	10		1	1	8	3	5	8	2		1	1	61	8	3	11
Med. Rec. Lib.		3	3	6	2	3	6	9	2	1	1	2	14	2		2
Med. Rec. Tech.	11				18		3	3	2		1	1	23	1	4	5
Soc. Wker.	14	3		3	12	2	7	9	1		2	2	11	3	2	5
Soc. Wk. Asst.	1				3								3		1	1
Pharm.	4				7	3	3	6			1	1	26	3	1	4
Pharm. Asst.	4				5						1	1	9	0	2	2
Number of reporting hospitals:	4				N = 8				N = 5				N = 23			
Number of reporting beds:	1,979				Beds = 3,515				Beds = 311				Beds = 3,441			

TABLE B-4 (CONT.)

Manpower Resources and Needs in Michigan Hospitals, by Region, 1966

Occupation	Saginaw-Bay Region Supply FTE	Additional Needs BV	AN	Total	Lansing Supply FTE	Additional Needs BV	AN	Total	Flint Supply FTE	Additional Needs BV	AN	Total	Benton Harbor-St. Joseph Supply FTE	Additional Needs BV	AN	Total
Reg. Nurse	678	82	231	313	400	68	69	137	384	65	47	112	129	8	50	58
L.P.N.	311	47	132	179	227	38	37	75	370	48	70	118	46	13	39	52
Med. Tech.	92	6	34	40	76	14	8	22	50	8	11	19	17		4	4
Lab. Asst.	47	3	8	11	16	1		1	28	2	3	5	3		1	1
Cytotech.	1		1	1	3		1	1					1			
Histol. Tech.	7		1	1	4	1	2	3	6				2			
Occup. Ther.	15	1	13	14	25		3	3	15		4	4	1		1	1
O.T.A.			5	5	--	--	--	--			2	2	1		2	2
Phys. Ther.	13	5	11	16	5	2	3	5	13	4	8	12	3			
P.T.A.	21	2	10	12	3	1	1	2	19		4	4	6		1	1
Recreat. Ther.	6		6	6		1	2	3	9	2	8	10				
Inhal. Ther.	16	2	12	14	27	3	6	9	4	1	5	6	2		1	1
X-Ray Tech.	55	6	13	19	38	6	8	14	32	8	6	14	13			
X-Ray Asst.	21		4	4	10	1	1	2	10		2	2	2			
EKG Tech.	14		4	4			1	1	10	2	1	3	3			
EEG Tech.	9		1	1	2	1		1			1	1				
Surg. Tech.	44	3	35	38	22	2	1	3	12	5	3	8	11	4	9	13
Med. Rec. Lib.	12	1	3	4	7	1	3	4	10		2	2	6	1		1
Med. Rec. Tech.	42	1	6	7	29	1		1	15	1	1	2	10	1		1
Soc. Wker.	13	3	8	11	7	1	2	3	13	5	8	13				
Soc. Wk. Asst.	4		2	2	1	-	-	-	3	2	2	4	2	1	1	2
Pharmacist	20	2	7	9	17		3	3	11	2	5	7	3			
Pharm. Asst.	11	1	6	7	7	-	-	-	7	1	4	5	2			
Number of reporting hospitals:	18				N = 7				N = 9				N = 5			
Number of reporting beds:	5,631				Beds = 1,155				Beds = 4,974				Beds = 539			

175

TABLE B-4 (CONT.)

Manpower Resources and Needs in Michigan Hospitals, by Region, 1966

Occupation	Kalamazoo-Battle Creek Region				Jackson				Detroit			
	Supply	Additional Needs			Supply	Additional Needs			Supply	Additional Needs		
	FTE	BV	AN	Total	FTE	BV	AN	Total	FTE	BV	AN	Total
Reg. Nurse	545	73	72	145	236	4	16	20	4835	1045	1171	2216
L.P.N.	338	45	48	93	149	23	10	33	2576	473	720	1193
Med. Tech.	74	10	25	35	38	3		3	942	116	173	289
Lab. Asst.	25	1	6	7	32				318	40	50	90
Cytotech.	1		1	1	2				18	14	19	33
Histol. Tech.	6		2	2	4				82	9	12	21
Occup. Ther.	72	2	14	16	6	1		1	330	33	93	126
O.T.A.	12		1	1		1		1	19	9	59	68
Phys. Ther.	14	2	8	10	5	1		1	123	28	48	76
P.T.A.	21	2	15	17	11				100	10	29	39
Rec. Ther.	27	1	40	41					70	12	64	76
Inhal. Ther.	11		3	3	3		1	1	84	25	58	83
X-Ray Tech.	47	7	4	11	22				403	74	91	165
X-Ray Asst.	6	2	5	7	7				135	22	20	42
EKG Tech.	13	1		1	4				102	11	26	37
EEG Tech.	4		3	3	1				45	2	15	17
Surg. Tech.	29	1	7	8	7				353	42	68	110
Med. Rec. Lib.	11		4	4	7				94	17	25	42
Med. Rec. Tech.	10	2	8	10	12				120	11	22	33
Soc. Wker.	33	7	35	42	3				260	49	167	216
S. W. Asst.					1				14	0	5	5
Pharmacist	18	4	2	6	7	1	1	2	236	26	64	90
Pharm. Asst.	13		1	1	1				70	8	25	33
Number of reporting hospitals:	13				N = 6				N = 79			
Number of reporting beds:	7,408				Beds = 926				Beds = 29, 158			

APPENDIX C

EDUCATIONAL PROGRAMS PREPARING HEALTH MANPOWER IN MICHIGAN

Introduction

The following tables present an overview of the output of formal educational programs to prepare health manpower in Michigan for academic years 1966-67 and 1967-68. Certificates and degrees awarded for selected health fields by school and level of training were compiled from the following sources: Higher Education General Information Survey (HEGIS) conducted by the Michigan Department of Education, following the taxonomy established by the U.S. Office of Education; American Medical Association Council on Medical Education; HEW; Council on Dental Education of the American Dental Association; the Michigan Board of Nursing; and personal contact. The HEGIS served as the major source since it purports to be a comprehensive source of data for enrollments and degrees awarded for all public and private institutions of higher education. However, incomplete reporting and inadequate refinement of reporting categories, particularly at the less than baccalaureate level, make impossible complete and wholly accurate tabulations. Inaccuracies and inadequacies in the data reflect the present reporting methods at both the national and state levels.

FIGURE 1

PUBLIC BACCALAUREATE COLLEGES AND UNIVERSITIES

1. Central Michigan University
2. Eastern Michigan University
3. Ferris State College
4. Grand Valley State College
5. Lake Superior State College
6. Michigan State University
7. Michigan Technological University
8. Northern Michigan University
9. Oakland University
10. Saginaw Valley College
11. U of M - Ann Arbor
12. (U of M) - Dearborn Campus
13. (U of M) - Flint College
14. Wayne State University
15. Western Michigan University

APPENDIX C - FIGURE 2

1. Adrian College
2. Albion College
3. Alma College
4. Andrews University
5. Cleary College
6. Concordia Lutheran College
7. General Motors Institute
8. Hillsdale College
9. Hope College
10. Kalamazoo College
11. Maryglade College
12. Nazareth College
13. Northwood Institute
14. Olivet College
15. Owosso College
16. St. Mary's College
17. Siena Heights College
18. Spring Arbor College
19. Suomi College
20. Western Theological Seminary

GRAND RAPIDS AREA

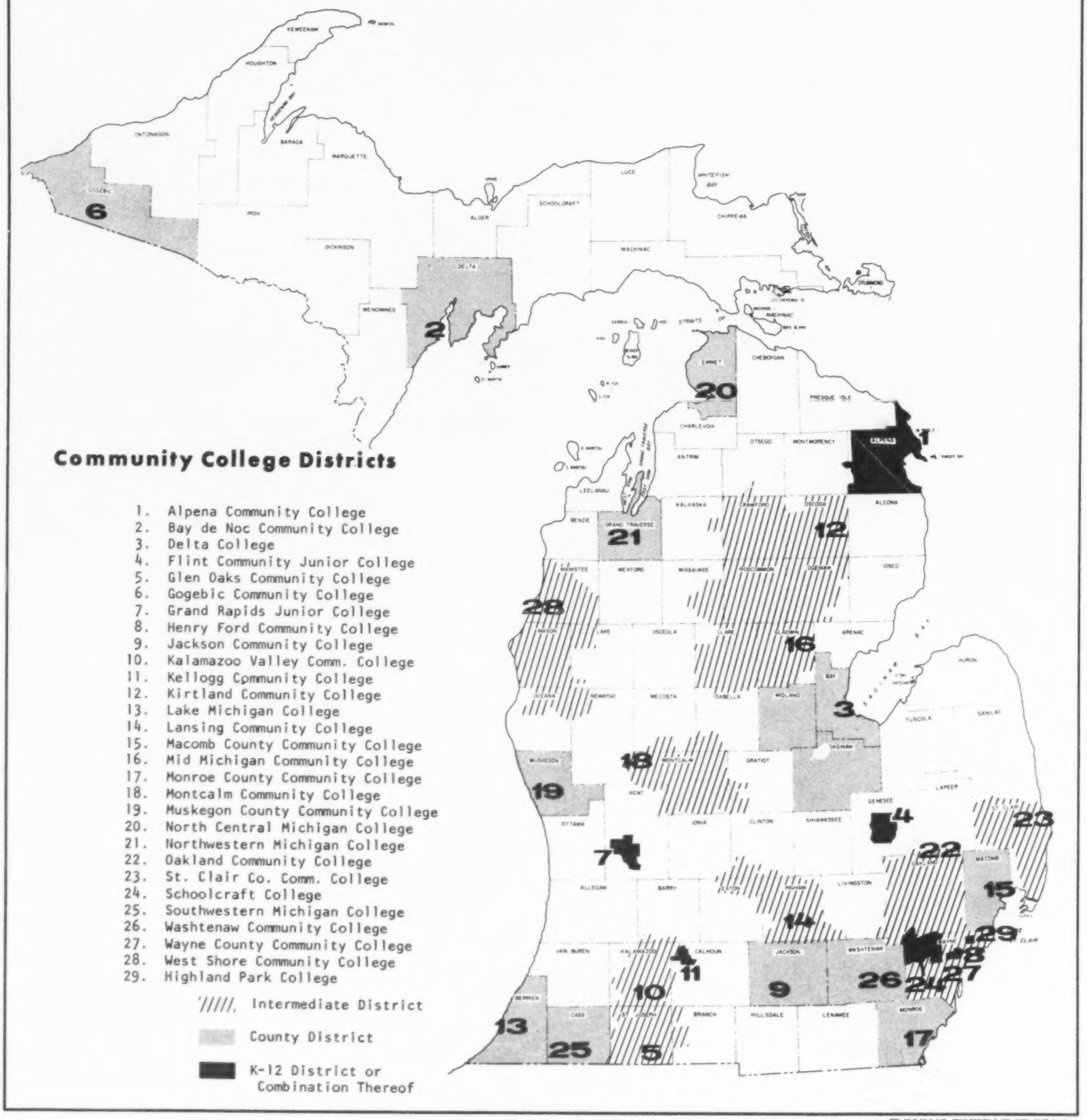
21. Aquinas College
22. Calvin College & Seminary
23. Davenport College of Business
24. Grace Bible College
25. Grand Rapids Baptist Bible College and Seminary
26. Muskegon Business College
27. Reformed Bible Institute

DETROIT AREA

28. Art School of the Society of Arts & Crafts
29. Chrysler Institute
30. Cranbrook Academy of Art
31. Delima Junior College
32. Detroit Bible College
33. Detroit College of Business
34. Detroit College of Law
35. Detroit Institute of Musical Art
36. Detroit Institute of Technology
37. Duns Scotus College
38. Lawrence Institute of Technology
39. Madonna College
40. Marygrove College
41. Mercy College
42. Merrill-Palmer Institute
43. Michigan Christian Junior College
44. Michigan College of Osteopathic Medicine
45. Michigan Lutheran College
46. Midrosha College of Jewish Studies
47. Sacred Heart Seminary
48. St. Johns Provincial Seminary
49. University of Detroit
50. Walsh College of Accounting and Business

FIGURE 3

OPERATING COMMUNITY COLLEGE DISTRICTS IN MICHIGAN
September, 1969



Community College Districts

1. Alpena Community College
2. Bay de Noc Community College
3. Delta College
4. Flint Community Junior College
5. Glen Oaks Community College
6. Gogebic Community College
7. Grand Rapids Junior College
8. Henry Ford Community College
9. Jackson Community College
10. Kalamazoo Valley Comm. College
11. Kellogg Community College
12. Kirtland Community College
13. Lake Michigan College
14. Lansing Community College
15. Macomb County Community College
16. Mid Michigan Community College
17. Monroe County Community College
18. Montcalm Community College
19. Muskegon County Community College
20. North Central Michigan College
21. Northwestern Michigan College
22. Oakland Community College
23. St. Clair Co. Comm. College
24. Schoolcraft College
25. Southwestern Michigan College
26. Washtenaw Community College
27. Wayne County Community College
28. West Shore Community College
29. Highland Park College

////// Intermediate District

County District

K-12 District or Combination Thereof

APPENDIX C, TABLE 1

PROGRAM OFFERINGS IN SELECTED HEALTH FIELDS IN MICHIGAN: FALL 1969

Field of Study	Level of Training*	Number of Programs[1]
ADMINISTRATION OF HEALTH SERVICES		
Hospital Administration	P	1
Medical Care Administration	P,D	1
Public Health Administration	P,D	1
Other	B,A[2]	2
DENTAL HEALTH SERVICES		
Dentist	P	2
Dental Hygiene	M,B,A	4
Dental Assistant	C,A	13
Dental Laboratory Technician	A	2
Dental Public Health	P,D	1
Clinical Dental Sciences	M	2
DIETETIC AND NUTRITIONAL SERVICES		
Foods and Nutrition	B,M,D,	9
Public Health Nutrition	P	1
Food Service Supervisor	A	8
Food Service Aide	C	1
ENVIRONMENTAL HEALTH		
Sanitary Engineer	B,P,M,D	4
Radiological Health Specialist	M,D	2
Industrial Hygiene	P,M,D	2
Environmental Health Specialist	P,M,D	4
Environmental Health Sanitarian	B,A	1
Water & Waste Water Technology	A	1
HOSPITAL BASED TECHNICIANS		
Inhalation Therapy	A	4
MEDICAL ENGINEERING		
Medical Engineer (Bioengineer)	M,D	1
MEDICAL RECORDS		
Medical Record Librarian	B	1
Medical Record Technician	A	1
MEDICAL ILLUSTRATION		
Medical Illustrator	M	1

*C - Certificate
A - Associate Degree
B - Bachelor's Degree
P - First Professional
M - Master's Degree
D - Doctoral Degree

Field of Study	Level of Training	Number of Programs[1/]
MEDICAL LABORATORY TECHNOLOGY AND RELATED SERVICES		
Medical Technologist		
Educational Institutions	C,B	22
Hospital-based Programs	C	38
Cytotechnologist		
Educational Institutions	C	2
Hospital-based Programs	C	1
Certified Laboratory Assistant	C	3
Other Laboratory Assistant	C	1
MEDICAL SECRETARIAL AND OFFICE SERVICES		
Medical Office Assistant	C,A	8
Medical Secretary	C,A	15
MEDICINE AND OSTEOPATHY		
Doctor of Medicine	P	3
Doctor of Osteopathy	P	1
Clinical Medical Sciences	M,D	2
NURSING AND RELATED SERVICES		
Registered Nurse[4/]		
Educational Institutions	A,B,M	22
Hospital Diploma	C	20
Practical Nurse	C	31
Public Health Nursing	P	1
OCCUPATIONAL THERAPY		
Occupational Therapist	B,M	3
Occupational Therapy Assistant	C	1
PHARMACY		
Pharmacist	B,M,D	3
PHYSICAL THERAPY		
Physical Therapist	B	2
PSYCHOLOGY		
Clinical Psychology	M,D	4

Field of Study	Level of Training	Number of Programs[1/]
RADIOLOGIC TECHNOLOGY		
X-Ray Technician		
Educational Institutions	A	7
Hospital-based Programs	C	36
SOCIAL WORK		
Social Worker	P	4
SPECIALIZED REHABILITATION SERVICES		
Music Therapist	B,M	2
SPEECH PATHOLOGY AND AUDIOLOGY		
Speech Pathology and Audiology	B,M,D	9
VETERINARY MEDICINE		
Veterinarian	P,M	1
Laboratory Animal Technician	C	1
VISUAL SERVICES AND EYE CARE		
Optical Technology	C	1
Orthoptist	C	2
VOCATIONAL REHABILITATION		
Rehabilitation Counselor	M,D	2

1/ Institutional offering which includes more than one level of degree in same discipline or field of study is counted as one program.
2/ Bachelor's level program in health facility administration at Michigan State University is being phased out.
3/ The Michigan College of Osteopathic Medicine, a private institution located in Pontiac, accepted its first students in fall, 1969. The MCOM will be phased out in 1970-71 when a new, publicly supported college of osteopathic medicine is established at Michigan State University, East Lansing, pursuant to Act 162, Public Acts of 1969.
4/ Two new programs were initiated in educational institutions, fall, 1969; two of the twenty diploma schools shown above will be phased out in 1969.

*New program
**First graduating class

APPENDIX C - TABLE 2

CERTIFICATES AND DEGREES AWARDED FOR SELECTED HEALTH FIELDS IN MICHIGAN

BY SCHOOL: 1966-1969[1]

Field of Study and Institution	Less than Baccalaureate[2]			Baccalaureate			First Professional and Master's[3]			Doctor's		
	1967	1968	1969	1967	1968	1969	1967	1968	1969	1967	1968	1969
ADMINISTRATION OF HEALTH SERVICES												
Hospital Administration												
University of Michigan							16	13	11			
Medical Care Administration												
University of Michigan							23	16				
Public Health Administration												
University of Michigan							16	9				
Other												
Michigan State University[4]				6	2	6						
Northwood Institute (A)*												
TOTAL				6	2	6	55	37	11			
DENTAL HEALTH SERVICES												
Dentist												
University of Detroit							61	56	69			
University of Michigan							78	81	84			
TOTAL							139	137	153			

1/ Graduates are given for the academic year. Thus, 1967 identifies graduates for the period September 1, 1966 - August 31, 1967.
2/ Includes certificate, diploma, and associate degree levels; where a listing includes both, certificate and diploma programs are marked (C) and associate degree (A).
3/ Includes M.D., D.D.S., D.V.M., M.S.W., M.P.H. degrees.
4/ Discontinued, 1969.

*New program
**First graduating class

Field of Study and Institution	Less than Baccalaureate 1967	1968	1969	Baccalaureate 1967	1968	1969	First Professional and Master's 1967	1968	1969	Doctor's 1967	1968	1969
Clinical Dental Sciences												
University of Detroit							4	0	0			
University of Michigan							25	32	18	1	1[5/]	0
TOTAL							29	32	18	1	1	0
Dental Public Health												
University of Michigan							14	10				
TOTAL							14	10				
Dental Assistant												
Bay de Noc Community College (A)*												
Delta College (A)									1**			
Ferris State College (A)		21	37						38			
Flint Community Junior College (C)		10	4						8			
Grand Rapids Junior College (A)		5	5						14			
Lansing Community College (C)			8**						5			
Michigan Lutheran (C)			6**						n.v.			
Macomb County Community College (A)*												
Muskegon County Community College (C)			15**						13			
Northwestern Michigan College (A)		3	3						4			
Washtenaw Community College (A)									2**			
University of Detroit (C)		12	16						20			
Oakland Community College (C)		3	4						5			
TOTAL		54	98						109			
Dental Hygiene												
Ferris State College (A)		22	35						26			
Flint Community Junior College (A)									19**			

5/ Ph.D. shared with other discipline.

*New program
**First graduating class

Field of Study and Institution	Less than Baccalaureate 1967	1968	1969	Baccalaureate 1967	1968	1969	First Professional and Master's 1967	1968	1969	Doctor's 1967	1968	1969
Dental Hygiene (cont.)												
University of Detroit (C)	36	33	38			3						
University of Michigan (C)		13	5	24	27	35	4	3	3			
TOTAL	58	81	88	24	27	38	4	3	3			
Dental Laboratory Technician												
Ferris State College (A)		14**	13									
Highland Park College (A)			2**									
TOTAL		14	15									
DIETETIC AND NUTRITIONAL SERVICES												
Foods and Nutrition												
Andrews University				4	0	1						
Eastern Michigan University				3	4							
Marygrove College				4	8	3						
Michigan State University[6/]				22	27	32	3	4	4	3	0	
Mercy College				0	0							
Nazareth				1	0							
Northern Michigan University				2	0							
Western Michigan University				0	0							
Wayne State University				0	0							
TOTAL				36	39	n.a.	3	4	4	3	0	
Public Health Nutrition												
University of Michigan							8	9				
TOTAL							8	9				
Food Service Supervisor[7/]												
Ferris State College (A)	9	15	11									
Flint Community Junior College (A)												
Kalamazoo Valley Community College (A)												
Northwestern Michigan College (A)												

6/ Includes Dietetics and Research in Foods.
7/ Incomplete reporting on HEGIS forms for this category.

*New program
**First graduating class

Field of Study and Institution	Less than Baccalaureate 1967	1968	1969	Baccalaureate 1967	1968	1969	First Professional and Master's 1967	1968	1969	Doctor's 1967	1968	1969
Food Service Supervisor (cont.)												
Oakland Community College (A)		1	5									
Northwood Institute (A)												
Washtenaw Community College (A)												
Northern Michigan University (C)												
TOTAL	n.a.	n.a.	n.a.									
Food Service Aide												
Northern Michigan University												
TOTAL												
ENVIRONMENTAL HEALTH SERVICES												
Sanitary Engineer												
Michigan Technological Institute							0	0	0			
University of Michigan							11	9	9			
Michigan State University							0	1	1			
Wayne State University							0	0	0			
TOTAL							11	10	10			
Radiological Health Specialist (Including Health Physicist)												
University of Michigan							13	14		2	3	
Wayne State University							0	0		0	0	
TOTAL							13	14		2	3	
Industrial Hygiene												
University of Michigan							10	11		1	0	
Wayne State University							2			0	0	
TOTAL							12	11		1	0	
Environmental Sanitarian (Including Assistant)												
Ferris State College	17	21		16								
TOTAL	17	21		16								

*New program
**First graduating class

Field of Study and Institution	Less than Baccalaureate 1967	1968	1969	Baccalaureate 1967	1968	1969	First Professional and Master's 1967	1968	1969	Doctor's 1967	1968	1969
Environmental Health Specialist												
University of Michigan												
a. Administration and Practice							11	11				
b. Food Contact							5	2				
c. Hospital and Institutional Environment							1	1				
d. Water Contact							12	10		2		
TOTAL							29	24		2		
HOSPITAL BASED TECHNICIANS												
Inhalation Therapy												
Highland Park College*												
Macomb County Community College*			1									
N. Central Michigan College*												
Washtenaw Community College		12**	28									
TOTAL			12									
MEDICAL ENGINEERING												
Bio-Engineering												
University of Michigan							8	6		3	3	
TOTAL							8	6		3	3	
MEDICAL RECORDS												
Medical Record Librarian												
Mercy College of Detroit				4	6	11						
TOTAL				4	6	11						
Medical Record Technician												
Schoolcraft College (A)*												
TOTAL												

*New program
**First graduating class

Field of Study and Institution	Less than Baccalaureate 1967	1968	1969	Baccalaureate 1967	1968	1969	First Professional and Master's 1967	1968	1969	Doctor's 1967	1968	1969
MEDICAL LABORATORY TECHNOLOGY AND RELATED SERVICES												
Medical Technologist												
Albion College				0	0							
Alma College				0	0							
Andrews				6	6							
Aquinas College				1	0	1						
Calvin College				6	11	6						
Central Michigan University				0	0	4						
Detroit Institute of Technology				2	2	10						
Eastern Michigan University				8	9	5						
Madonna College				3	5	4						
Marygrove College				0	0	4						
Michigan Lutheran College				1	2	4						
Michigan State University				49	36	47						
Michigan Technological Univ.				5	5	4						
Northern Michigan University				5	1	4						
Nazareth College				0	0							
Siena Heights College				0	0							
University of Detroit				5	8	4						
University of Michigan				29	31	25						
Wayne State University				23	18	29						
Western Michigan University				13	17	17						
Grand Valley State College				0	0	1						
Mercy College of Detroit				5	6	1						
Lake Superior				0	1	1						
Ferris State*												
TOTAL				161	158	171						
Medical Technology[8/] (Hospital Based)												
Gratiot Community Hospital, Alma				na								

8/ Total program completions represent high proportion of duplication of bachelor's degrees in Med. Technology listed in preceding section of table. See discussion in Part II of text.

*New program
**First graduating class

Field of Study and Institution	Less than Baccalaureate			Baccalaureate			First Professional and Master's			Doctor's		
	1967	1968	1969	1967	1968	1969	1967	1968	1969	1967	1968	1969
Medical Technology (Hospital Based, cont.)												
University of Michigan Medical Center, Ann Arbor			9/									
Oakwood Hospital, Dearborn			5									
Veterans Admin. Hospital, Dearborn			4									
Detroit Gen. Hospital, Central Branch, Detroit			5									
Evangelical Deaconess Hospital-Jennings Mem. Hosp., Combined School, Detroit			na									
			na									
Grace Hospital, Detroit			10									
Harper Hospital, Detroit			9									
Henry Ford Hospital, Detroit			6									
Herman Kiefer Hosp., Detroit			3									
Hutzel Hospital, Detroit			2									
Mt. Carmel Mercy Hosp., Detroit			6									
St. John Hosp., Detroit			6									
Sinai Hosp. of Detroit			4									
Wayne County Gen. Hosp., Eloise			9									
St. Francis Hosp., Escanaba			na									
Hurley Hospital, Flint			5									
McLaren Gen. Hosp., Flint			6									
St. Joseph Hospital, Flint			3									
Blodgett Memorial Hospital, Grand Rapids			7									
Butterworth Hospital, Grand Rapids			13									
St. Mary's Hospital, Grand Rapids			8									
W. A. Foote Memorial Hosp., Jackson			1									
Borgess Hospital, Kalamazoo			6									
Bronson Methodist Hospital, Kalamazoo			4									

9/ Graduates reported under The University of Michigan.

*New program
**First graduating class

Field of Study and Institution	Less than Baccalaureate 1967	1968	1969	Baccalaureate 1967	1968	1969	First Professional and Master's 1967	1968	1969	Doctor's 1967	1968	1969
Medical Technology (Hospital Based, cont.)												
Edward W. Sparrow Hospital, Lansing	6											
St. Lawrence Hospital, Lansing	2											
St. Mary Hospital, Livonia	1											
Hackley Hospital, Muskegon	4											
Little Traverse Hospital, Burns Clinic, Petoskey	2											
Pontiac General Hospital, Pontiac	na											
St. Luke's Hospital, Saginaw	8											
St. Mary's Hospital, Saginaw	1											
Providence Hospital, Southfield	na											
Munson Medical Center, Traverse City	na											
TOTAL	153											
Cytotechnologist												
Wayne State University				2	2							
University of Michigan - Univ. Hosp.					4**							
Harper Hospital				4	4							
TOTAL				6	10							
Certified Laboratory Assistant												
Highland Park College					0							
Northern Michigan University												
St. Joseph's Hospital, Mt. Clemens					na							
TOTAL					0							
Medical Laboratory Assistant												
Oakland					2	3						
TOTAL					2	3						

*New program
**First graduating class

Field of Study and Institution	Less than Baccalaureate 1967	1968	1969	Baccalaureate 1967	1968	1969	First Professional and Master's 1967	1968	1969	Doctor's 1967	1968	1969
MEDICAL SECRETARIAL AND OFFICE SERVICES[10]												
Medical Office Assistant												
Ferris State College (A)		17	15									
Highland Park College (C)	23	14	33									
Kalamazoo Valley Community												
Lake Michigan College												
Lansing Community College												
Macomb County Community College												
Northwestern Michigan College (C)		11	13									
Oakland Community College (C) (A)		5										
Washtenaw Community College (A)												
Michigan Lutheran College (A)		39										
TOTAL	na	na	na									
Medical Secretary												
Andrews University												
Flint Community Junior College (A)		5	9									
Glen Oaks Community College												
Grand Rapids												
Kellogg Community College												
Lansing Community College												
Muskegon County Community College												
Northwestern Mich. College												
Northern Michigan University (C)		2										
Oakland Community College												
Schoolcraft College												
Washtenaw Community College												
Detroit College of Business												
Davenport College of Business												
Carnegie												
TOTAL		na	na									

10/ Incomplete data reporting on HEGIS forms for this category.

*New program
**First graduating class

Field of Study and Institution	Less than Baccalaureate			Baccalaureate			First Professional and Master's			Doctor's		
	1967	1968	1969	1967	1968	1969	1967	1968	1969	1967	1968	1969
MEDICINE AND OSTEOPATHY												
Medicine												
Michigan State University*							--	--				
University of Michigan							182	186	200			
Wayne State University							98	125	118			
Subtotal							280	311	318			
Clinical Medical Sciences												
University of Michigan							21	19	17			2
Wayne State University							2	3	0			
Subtotal							23	22	17			2
Osteopathy												
Mich. College of Osteopathic Medicine*11/												
TOTAL							303	333				
NURSING AND RELATED SERVICES												
RN - Baccalaureate and Higher												
Andrews University*												
Ferris State*												
Madonna College				21	17	21						
Mercy College of Detroit				40	57	62						
Nazareth College*												
Michigan State University				43	45	71						
Northern Michigan University*												
U-M, School of Nursing				126	151	175	11	26	15			
U-M, School of Public Health							25	27				
Wayne State University				44	83	83	34	48	73			
Subtotal				274	353	412	70	101	88			

11/ See footnote 3, Appendix Table C-1.

*New program
**First graduating class

Field of Study and Institution	Less than Baccalaureate 1967	1968	1969	Baccalaureate 1967	1968	1969	First Professional and Master's 1967	1968	1969	Doctor's 1967	1968	1969
RN-Associate Degree Programs												
Delta College	27	29	50									
Ferris State College*	--	--										
Flint Community Junior College	34	39	70									
Grand Rapids Junior College	--	--	15**									
Henry Ford Community College	53	66	57									
Highland Park College	20	35	32									
Kellogg Community College	22	32	30									
Lansing Community College	0	20	32									
Macomb County Community College	18	15	2									
Northwestern Michigan College	25	30	20									
North Central Michigan College	0	4	8									
Oakland Community College	21	29	27									
St. Clair Community College	32	20	39									
Schoolcraft College	16	13	18									
TOTAL	268	332	400									
Registered Nurse												
Diploma-Hospital-Based												
Blodgett Memorial Hospital, Grand Rapids	28	33	72									
Borgess School of Nursing Kalamazoo	33	39	31									
Bronson Methodist Hospital, Kalamazoo	51	62	64									
Butterworth Hospital, Grand Rapids	37	98	49									
Evangelical Deaconess Hosp., Detroit	34	15	18									
Grace Hospital, Detroit	46	85	85									
Hackley Hospital, Muskegon	33	69	34									
Harper Hospital, Detroit	115	136	60									
Henry Ford Hospital, Detroit	87	92	92									
Hurley Hospital, Flint	90	72	84									
Mercy School of Nursing, Detroit	71	69	69									
Mercy Central School of Nursing, Grand Rapids	37	33	37									

*New program
**First graduating class

Field of Study and Institution	Less than Baccalaureate 1967	1968	1969	Baccalaureate 1967	1968	1969	First Professional and Master's 1967	1968	1969	Doctor's 1967	1968	1969
Registered Nurse (cont.)												
Diploma-Hospital-Based (cont.)												
Mercy School of Nursing, Lansing[12]	28	29	11									
Providence Hospital, Southfield	72	44	68									
Saginaw General Hospital, Saginaw[13]	51	33	32									
St. Joseph School of Nursing, Flint	41	43	26									
St. Joseph Hospital, Hancock	18	13	19									
St. Luke's Hospital, Marquette	24	25	22									
St. Mary's School of Nursing, Saginaw	25	35	45									
W.A. Foote Memorial Hospital, Jackson	9	16	22									
TOTAL	930	1041	940									
Practical Nurse												
Alma Mt. Pleasant Practical Nurse Education Center	39	40	26									
Ann Arbor Practical Nurse Center	101	105	101									
Bay City Practical Nurse Center	36	34	40									
Detroit Practical Nursing Center	91	70	91									
Flint Community Junior College	75	59	60									
Glen Oaks Community College	0	14	14									
Grand Rapids Junior College	109	107	104									
Jackson Community College	32	36	21									

12/ Discontinued June, 1969.
13/ Discontinued June, 1969.

*New program
**First graduating class

Field of Study and Institution	Less than Baccalaureate			Baccalaureate			First Professional and Master's			Doctor's		
	1967	1968	1969	1967	1968	1969	1967	1968	1969	1967	1968	1969
Practical Nurse (cont.)												
Kalamazoo Practical Nursing Center	57	60	59									
Kellogg Community College	41	40	26									
Lake Michigan College	17	32	21									
Lake Superior State College	18	18	20									
Lansing Community College	67	60	42									
McPherson Health Center, Howell (H)[14/]	20	18	31									
M.D.T.A. School of Practical Nursing, Detroit (H)	145	156	158									
Mercy School of Practical Nursing, Cadillac (H)	38	32	26									
Midland Hospital School of Practical Nursing (H)	14	24	8									
Montcalm Community College	23	27	27									
Muskegon Community College	56	62	67									
Northern Michigan University	81	85	105[15/]									
Northwestern Mich. College	60	64	68									
Pine Rest School of Practical Nursing, Grand Rapids (H)	49	64	16									
Oakland County Community College	111	61	28									
St. Clair Community College	28	27	29									
Saginaw Practical Nursing School, Saginaw	21	54	23									
St. Joseph School of Practical Nursing	54	53	22									
Schoolcraft College	14	25	16									
Shapero School of Nursing, Detroit	66	63	75									
South Central Michigan School, Coldwater	13	19	21									
Southwestern Michigan College	20	15	29									
TOTAL	1535	1570	1418									

14/ (H) - Hospital-Based programs.
15/ Includes graduates from Gogebic Unit.

*New program
**First graduating class

Field of Study and Institution	Less than Baccalaureate			Baccalaureate			First Professional and Master's			Doctor's		
	1967	1968	1969	1967	1968	1969	1967	1968	1969	1967	1968	1969
OCCUPATIONAL THERAPY												
Occupational Therapist												
Eastern Michigan University				17	20	24						
Wayne State University				23	20	12						
Western Michigan University				29	24	38	3	2	4			
TOTAL				69	64	74	3	2	4			
Occupational Therapy Assistant												
Schoolcraft College (C)*												
PHARMACY												
Pharmacist												
Ferris State College				66	79	73						
University of Michigan				16	27	22	10	18	22	1	2	
Wayne State University				21	35	36	7	5	3			1
TOTAL				103	141	131	17	23	25	1	2	1
PHYSICAL THERAPY												
Physical Therapist												
University of Michigan				22	24	33						
Wayne State University				2	7	6						
TOTAL				24	31	29						
PSYCHOLOGY												
Clinical Psychology												
University of Detroit							12	na				
Michigan State University16/							23	na	15			
University of Michigan										4	12	
Wayne State University							4	na	3	4		1
TOTAL							39		3	23	12	1

16/ Includes all Master's in Psychology.

*New program
**First graduating class

Field of Study and Institution	Less than Baccalaureate 1966[17]	1967	1968	1969	Baccalaureate 1967	1968	1969	First Professional and Master's 1967	1968	1969	Doctor's 1967	1968	1969
RADIOLOGIC TECHNOLOGY													
X-Ray Technologist (College-Based)													
Delta College			3	3									
Ferris State College				5**									
Jackson Community College (A)			1	2									
Lake Michigan College (A)*													
Washtenaw Community College (A)				11**									
Northern Michigan University (A)													
TOTAL			4	21									
X-Ray Technologist (Hospital-Based)													
St. Joseph Mercy Hospital, Ann Arbor	7												
Leila Y. Post Montgomery Hospital, Battle Creek	n.a.												
Mercy Hospital, Bay City	0												
Mercy Hospital, Benton Harbor	3												
Detroit Memorial Hospital, Detroit	n.a.												
Grace Hospital, Detroit	9												
Henry Ford Hospital, Detroit	14												
Jennings Memorial Hospital, Detroit	3												
Mt. Carmel Mercy Hospital, Detroit	5												
St. John Hospital, Detroit	6												
Wayne County General Hospital and Infirmary, Eloise	3												
Hurley Hospital, Flint	16												
McLaren General Hospital, Flint	3												

17/ Most recent available data 1965-66 for Hospital-Based X-Ray Technologist.

*New program
**First graduating class

Field of Study and Institution	Less than Baccalaureate				Baccalaureate			First Professional and Master's			Doctor's		
	1966	1967	1968	1969	1967	1968	1969	1967	1968	1969	1967	1968	1969
X-Ray Technologist (Hospital-Based, cont.)													
St. Joseph Hospital, Flint				4									
Blodgett Memorial Hospital, Grand Rapids				5									
Butterworth Hospital, Grand Rapids				5									
St. Mary's Hospital, Grand Rapids				n.a.									
W.A. Foote Mem. Hospital, Jackson				3									
Borgess Hospital, Kalamazoo				2									
Bronson Methodist Hospital, Kalamazoo				1									
Edward W. Sparrow Hospital, Lansing				2									
St. Lawrence Hospital, Lansing				9									
St. Mary Hospital, Livonia				2									
St. Luke's Hospital, Marquette				1									
St. Joseph Hospital, Mt. Clemens				4									
Hackley Hospital, Muskegon				3									
Mercy Hospital, Muskegon				1									
Pontiac General Hospital, Pontiac				6									
St. Joseph Mercy Hospital, Pontiac				4									
Mercy Hospital, Port Huron				2									
St. Luke's Hospital, Saginaw				3									
William Beaumont Hospital, Royal Oak				6									
St. Mary's Hospital, Saginaw				4									
Annapolis Hospital, Wayne				3									
Wyandotte General Hospital, Wyandotte				4									
TOTAL				145									

209

*New program
**First graduating class

Field of Study and Institution	Less than Baccalaureate 1967	1968	1969	Baccalaureate 1967	1968	1969	First Professional and Master's 1967	1968	1969	Doctor's 1967	1968	1969
SOCIAL WORK												
Social Worker												
Michigan State University							46	53	44			
University of Michigan							213	228	233			3
Wayne State University							111	130	102			
Western Michigan University*												
TOTAL							370	411	379			3
SPECIALIZED REHABILITATION SERVICES												
Music Therapist												
Michigan State University				7	7		2	2				
Western Michigan University				3	3		2					
TOTAL				10	10	n.a.	4	2	n.a.			
SPEECH PATHOLOGY AND AUDIOLOGY												
Speech Pathology and Audiology												
Central Michigan University				10	62	67	2	0	12			
Eastern Michigan University				32	22	50	16	0	0			
Northern Michigan University				22	14	16	1	1	2			
University of Michigan						22	56	88	n.a.	10	3	
Wayne State University				15	24	17						
Western Michigan University				80	95	122	0	4	5			
Marygrove College				8	10	15						
Michigan State University				88[16/]	60	118	32	29	58	21	13	3
Andrews University				0	0							
TOTAL				255	287	427	107	122	77	31	16	n.a.
VETERINARY MEDICINE												
Veterinarian												
Michigan State University							58	96	89			

16/ Includes all degrees in Speech and Dramatic Arts.

*New program
**First graduating class

Field of Study and Institution	Less than Baccalaureate 1967	1968	1969	Baccalaureate 1967	1968	1969	First Professional and Master's 1967	1968	1969	Doctor's 1967	1968	1969
Veterinary Medicine Science												
Michigan State University							21	21		2		
Animal Laboratory Technician*												
Michigan State University												
VISUAL SERVICES AND EYE CARE												
Optical Technology												
Ferris State College	13	8	10									
Orthoptist												
Training Center												
Wayne State University												
Medical School, Kresge												
Eye Institute	2	0										
Preceptorships												
U of M Medical Center17/	1	0										
Edmond L. Cooper, M.D.,												
(Royal Oak, Michigan)	1	1										
VOCATIONAL REHABILITATION												
Rehabilitation Counselor												
Michigan State University							26	n.a.	n.a.			
Wayne State University							17	10	13			
TOTAL							43					

17/ Discontinued
n.a. - not available

Sources:

Annual Report on Dental Auxiliary Education 1967-68; Division of Educational Measurements Council on Dental Education, American Dental Association, 211 East Chicago Ave., Chicago, Ill.

Annual Report on Dental Education 1967-68, Part I, Division of Educational Measurements Council on Dental Education, American Dental Association, 211 East Chicago Ave., Chicago, Ill.

Council on Medical Education of the American Medical Association; Enrollments and Graduates for hospital-based Medical Technology programs in Michigan, 1965-66, 1966-67; Enrollments and Graduates for hospital-based X-Ray Technology programs in Michigan for 1965-66.

Dental Students' Register, 1966-67, Division of Educational Measurements Council on Dental Education, American Dental Association, 211 East Chicago Ave., Chicago, Ill.

Health Resources Statistics, Health Manpower and Health Facilities, 1968: PHS Pub. No. 1509, Public Health Service, U.S. Department of Health, Education, and Welfare, National Center for Health Statistics, December, 1968, Washington, D.C.

Higher Education General Information Survey. Unpublished data collected by the Michigan Bureau of Higher Education for the U.S. Office of Education, National Center for Educational Statistics, certificates and degrees awarded 1966-67, 1967-68.

Michigan Board of Nursing, 1033 S. Washington, Lansing, Michigan.

PUBLICATIONS OF THE EDUCATION FOR HEALTH CARE PROJECT

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4. Planning and Implementing Health Technology Programs in Community Colleges: A Procedural Guide. September, 1969*.

5. Report of the Citizens Committee on Education for Health Care. 1970.

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